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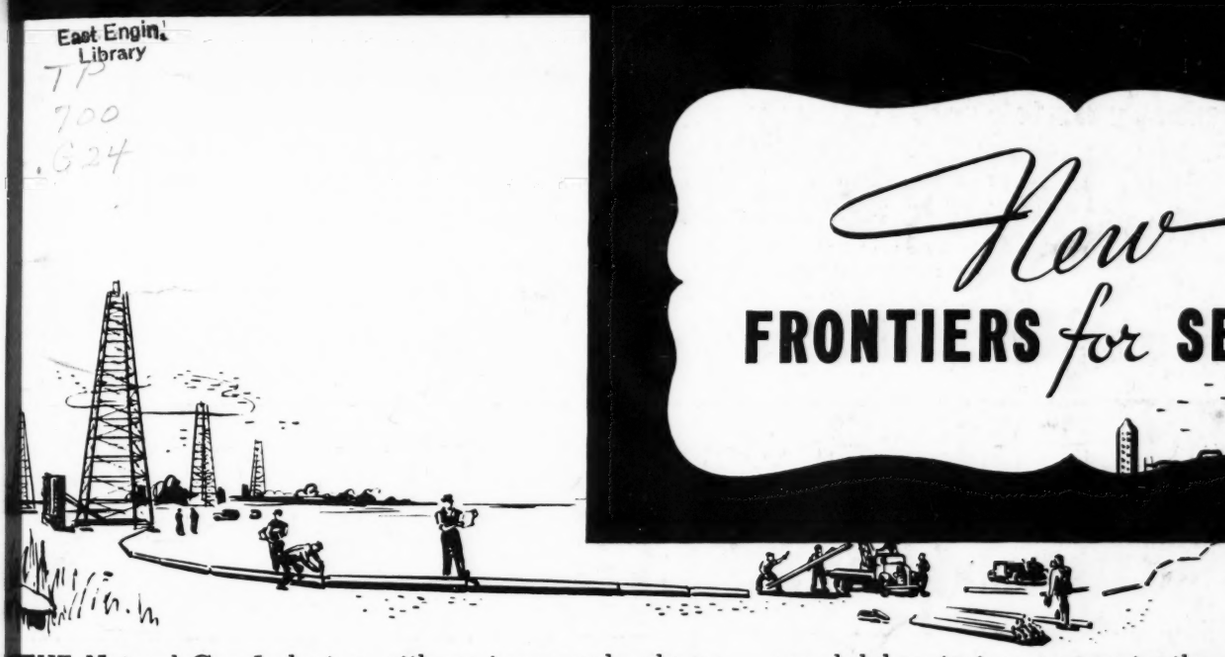

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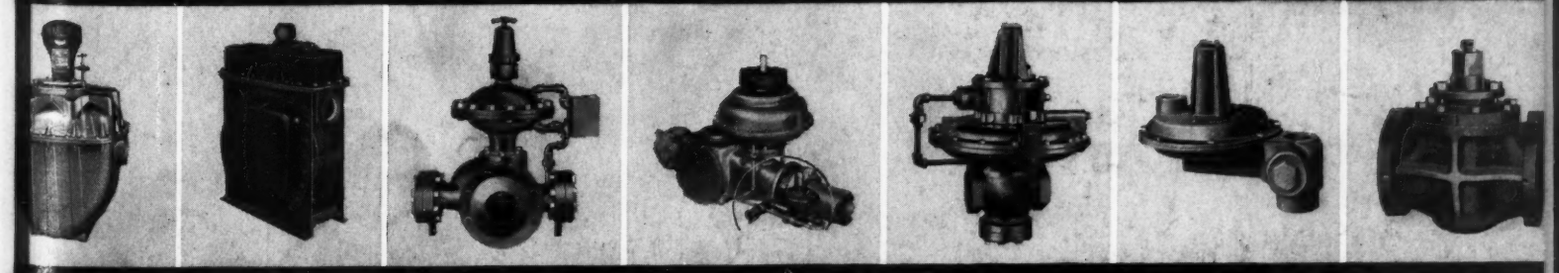

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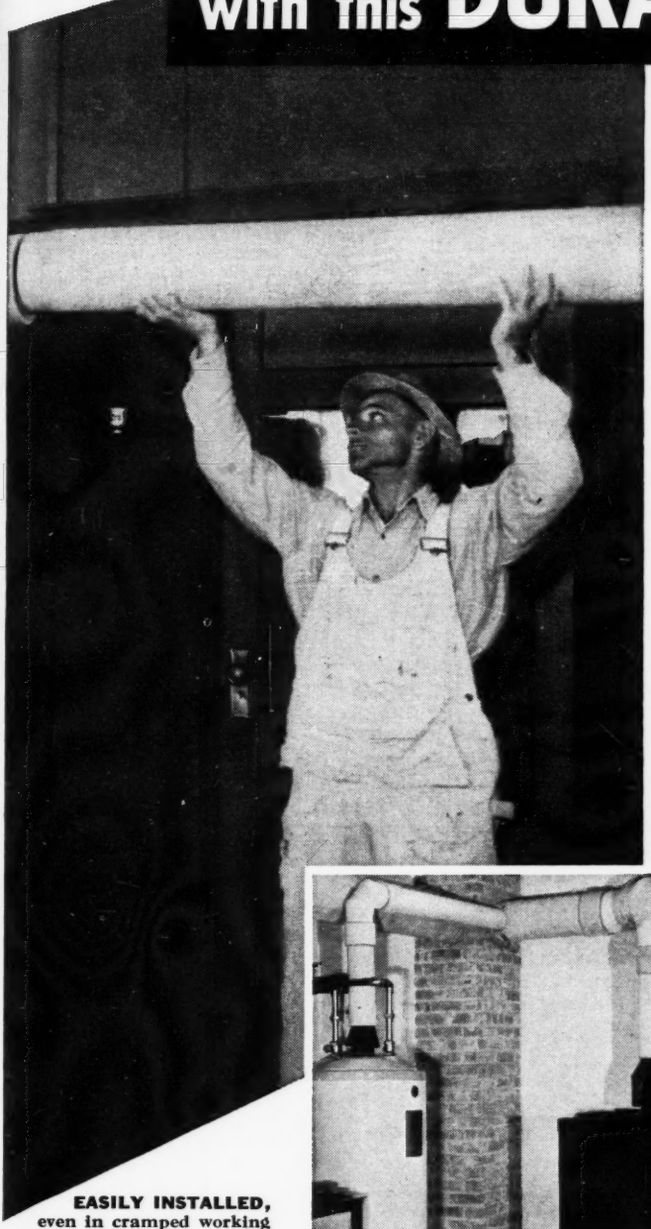

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GAS

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Seventeenth Year of Publication

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GUEST Editorial

The 36th Natural Gas Convention

By HARRY D. HANCOCK
Chairman, Natural Gas Section,
American Gas Association

THE convention of the Natural Gas Section of the American Gas Association to be held in Dallas, Texas, May 5-7, will be the 36th annual meeting of representatives of the natural gas industry of the United States and of the Dominion of Canada. Thus the industry, for a third time, makes a city located in the heart of a great natural gas area, with a background of accomplishment and a foreground of opportunity, the setting for this forum.

In prior years these conventions have been planned without giving much, if any, thought to the fact that the right of assembly was won by our forefathers through bitter struggle. In these days when aggression has deprived so many people of the most elementary liberties, we can no longer take for granted our freedom of assembly and the other freedoms which we enjoy, but must regard them as part of a hard-won heritage to cherish and defend. The millions of gas flames burning in homes and workshops throughout our country might well be regarded as symbols of our determination to retain our freedoms and to add new freedoms. By our meeting together to engage in free discussion of our common problems, we gather strength and inspiration from one another to carry on our task.

Our gas enterprises are not composed of metal and stone and other material things alone. It is the people comprised in the industry who transmute these material things into almost-living organisms and thus give them their principal components of value. It requires contributions of many kinds from many people to bring these enterprises into existence and to keep them functioning. It is appropriate at this time that we do not confine our consideration to gas wells, pipe lines, compressor stations, distribution systems, and the like, but give thought and recognition to the vision of the men who conceived these enterprises, managerial ability of those who directed them, the inventive genius of those who brought forth the physical facilities, the loyal work of those who operate and maintain them.

The unparalleled material and cultural gains achieved in the two great democracies to be represented at our convention have been attributed by many to the growth of science and engineering, and their application to the well-being of mankind. Others, on the contrary, are of the opinion that science has not been an aid to civilization because it places too much emphasis on material things and emphasizes too little the greater values of life which are not revealed by science alone. However, the preponderance of evidence supports the conclusion that society has been enriched and the well-being of mankind has been advanced through the contributions of science and engineering and that their continued development and application will accelerate material and cultural improvements in the years to come. It is of particular significance to the natural gas industry that one of the most important of these contributions, one which is perhaps the primary cause of fundamental changes in our own economy, as well as those of other parts of the world, has been the discovery and utilization of practical means by which heat energy can be made to do man's work for him. Some also claim that the application of science has created such powerful agencies of destruction and may in the future unleash so much more terrible forces that humanity would be better served had it declined to put forth its supreme efforts to attain the ultimate in science and engineering. It is plainly indicated by world events that a nation which fails to infuse science and technology into its national economy is left thereby so inferior in defensive power that it may be subjugated to military aggression.

While the problems confronting the natural gas industry as it approaches this 36th annual meeting are increasing in number and magnitude, there is determination to seek the best solutions through the hard method of toil and perseverance. A sound basis for optimism is furnished by the conviction that the industry's problems will be approached in this way and that we are inclined neither to over-confidence because of past accomplishments nor to the other extreme of defeatism because of lack of faith in ourselves, our industry, or our national economy.

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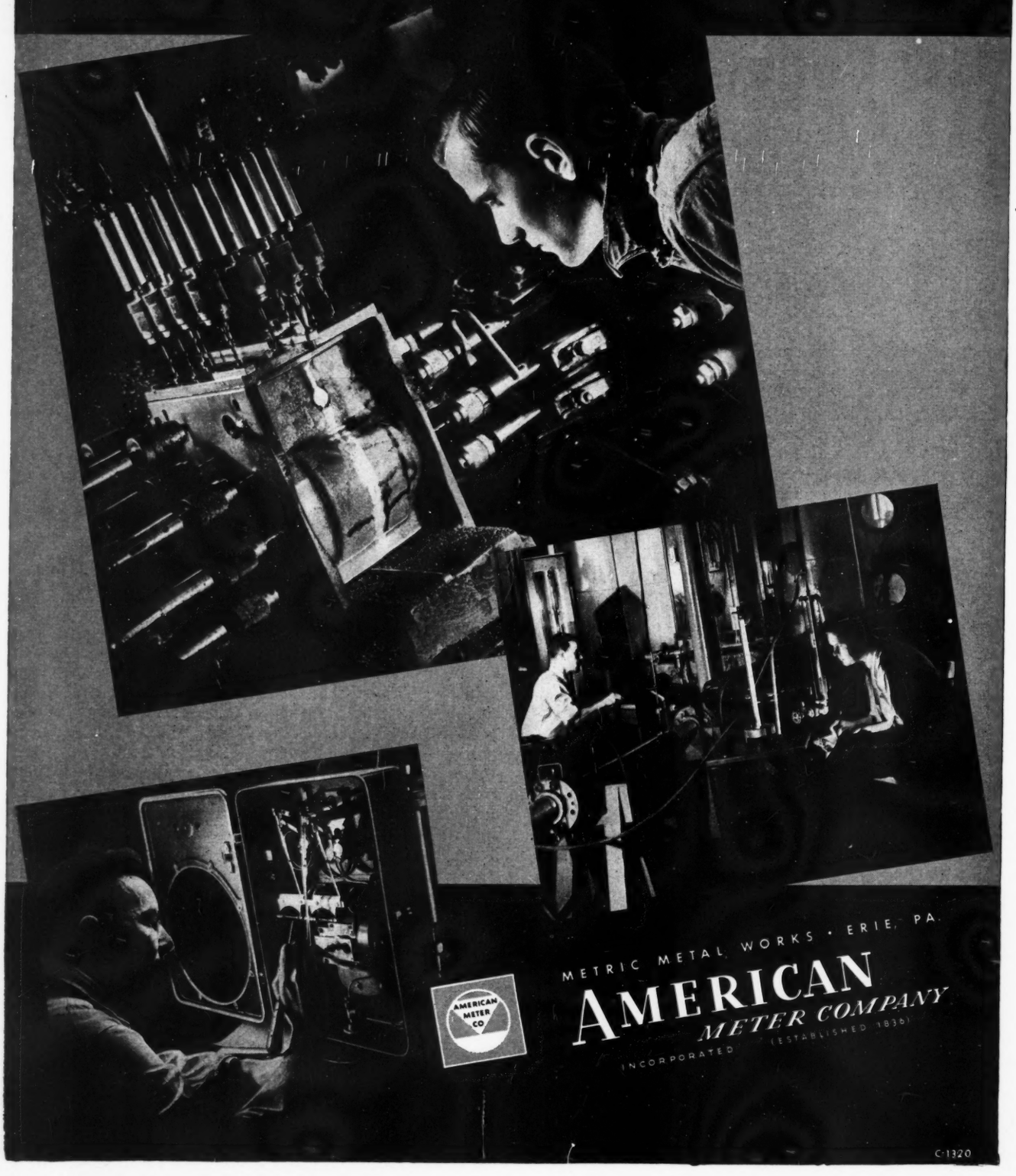

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THERMALLY *Thinking*

A Living Memorial

IN THESE days of mobilization for national defense, the sound of marching feet throughout the land is rising to a crescendo. More and more often long-familiar faces are suddenly disappearing from their accustomed places at desks and workbenches in the gas industry. Hardly an office or shop remains in which there are not one or more gaps in the ranks of those with whom we have worked.

All of these men have gone in answer to an official call. But to their credit, let it be recorded now that, despite the disruption it has meant in their lives, despite the discomforts and the physical labor it involves, practically all of them have answered that call cheerfully and willingly.

In their going they have placed upon those of us who remain behind a very real and indisputable obligation—the obligation to match their personal sacrifices with an equal personal effort to do the needed work at home with the same cheerful willingness

Such an effort today will be a more tangible memorial to these men and their works than all the scrolls and tablets that may ever be presented to them in the future.

Unit Defense Pool

DEFENSE preparation in the gas industry implies not only the willingness to do whatever may ultimately be required but also the will and the vision to anticipate in advance what the ultimate demands may be. Patriotic harangues in open meetings are no substitute for carefully laid plans for implementing that patriotism.

It was, therefore, with both pride and confidence that we listened recently to the discussions on "Public Utilities in National Defense" that occupied an entire afternoon session of the recent Distribution Conference held in April by the American Gas Association.

The work of the Association in looking toward an integration of both policy and methods will unquestionably place the industry in a position where it will be aware of the potential threat to its facilities, and individual operating companies can be expected to lay plans for minimizing the effect of any untoward eventuality.

However, it should be pointed out that still another avenue of industry preparation must be traversed if the local operating companies in each area are to marshal to their fullest strength all of their individual and collective resources.

To this end we recommend a plan which was informally discussed by delegates attending the Distribution Conference. In brief, the scheme would call for the companies in each geographical area to set up a joint program for the exchange of what might be termed a perpetual inventory of materials, equipment and men with special talents and skill that could be made available by one or more companies in an area when and if another company in emergency circumstances found it necessary to call for them.

Repair and emergency equipment of a type, or in quantities that would not normally be available with one utility, might under such a plan be listed on confidential sheets placed in the custody of the proper executive of every other company. Obviously, such a plan would have to represent a definite company policy, and the responsibility for emergency decisions lodged in an individual empowered to make such decisions immediately.

The Nazis have demonstrated time and time again that fear, confusion and hysteria within the ranks of their opponents have been their most potent allies. Careful planning to circumvent these devitalizing evils can only be made in advance. For a practical workable scheme to assure a minimum disruption of gas service under any conditions the unit defense pool plan has promising possibilities.

The Battles of Peace

THE primary objective of our national defense effort is to safeguard and secure our national survival. To this end all of our resources of men, money and materials are being mobilized, and it is unthinkable that any industry would fail to respond to the call of the emergency. The gas industry is not only participating and aiding the defense program, but it has also taken on itself the obligation of discovering and developing new avenues of national service.

However, although national survival is paramount, it is well to bear in mind that industry survival is also an essential and no effort can be spared to safeguard and improve the position that gas as a source of heat and power now occupies. For this reason it is essential that sales efforts must not be relaxed, but rather that they should be increased to the end that industry expansion will keep pace with the increased demand for domestic and commercial service that new consumer purchasing power will create.

It would be a sorry victory indeed for our industry if the end of the emergency should find gas relegated to a secondary position in the minds of the consuming public. Yet such an eventuality cannot be lightly ignored.

During 1941 and 1942 the electrical industry will add at least 6,000,000 kilowatts of new generating capacity. It is true that for the moment much of this new capacity will be used in the large power and industrial fields. But new generating capacity once added will never be allowed to stand idle if an alert and aggressive electrical industry can prevent it. It is only natural to assume that the attractive high rate

More Than 5000 Copies This Issue

residential and small commercial load will be diligently cultivated even during defense times—so that the sag in output will be minimized once the peak of defense demands has been met and passed. For while sales in the industrial classification rank first from the standpoint of electrical energy consumed, they stand third in gross revenue produced, being surpassed by both residential service and small commercial sales.

The coal industry, too, is embarking on big scale promotion plans designed to stem the growing acceptance of natural gas, particularly for house heating. Bituminous Coal Research, Inc., is now laying out a three-year program that will involve the total expenditure of $1,500,000 for advertising and publicity, and another $150,000 for research into improving combustion equipment and methods. In the middle western states the Bituminous Coal Utilization Committee is carrying the fight for the house heating business right into the heart of the natural gas territory. A new technique in coal advertising has been developed and tested over a two-year period, and now the story of automatic coal stoker heat is to be spread over the whole mid-continent. A yearly sum of $100,000 will be spent on this effort by coal producers, dealers and stoker distributors.

The job that must be done for gas is not solely the concern of the public utilities, but is as much a responsibility of the manufacturers of all gas appliances and all equipment used in the transmission and distribution of the fuel itself.

For the first time in a good many years manufacturers can now truthfully say, "We have more business than we can handle." Yet despite this new and encouraging aspect of plant production, they have shown a remarkable realization of the moral responsibility that rests on them to continue unabated the sales and promotional efforts which serve as both stimulant and sustenance to the sales departments of the operating utilities.

Authentic case histories of companies who relaxed their advertising, sales and research efforts during World War I chart clearly a path that leads to loss of prestige and loss of contacts with regular markets with eventual business disintegration the melancholy goal.

We can never afford to lose sight of the fact that conditions of peace, and not war, provide the only background for world progress. Yet unless we prepare to meet the challenges of peace even now with a whole world at war we may well awake to find peace itself intolerable.

Annual Reports

THE time has come when some comment should be made on the excellence of the 1940 annual reports published by gas utility companies throughout the country.

The object of the annual report has been to present information regarding company operations and finances to interested individuals. In the past the large companies have considered this information to be of interest only to stockholders and executives.

Yet who is more interested in a company than the employee who each day shoulders the responsibility of company operation. In recent years management has recognized this personal interest which the average employee feels for his company. This recognition has manifested itself in the publishing of annual reports and booklets which present facts and figures in such a manner that they may be easily understood by the average employee.

Some of the companies which have produced annual reports of exceptional caliber are: Consolidated Edison System Companies, Columbia Gas & Electric Co., Washington Gas Light Co., Peoples Gas Light & Coke Co., Laclede Gas & Light Co., Oklahoma Gas & Electric Co., Wisconsin Public Service Co., The San Diego Gas & Electric Co., and the Pacific Gas & Electric Co.

Merely as an indication of the great many colorfully illustrated and readable reports that have come to our attention we make brief mention of three: (1) The Consolidated Edison booklet contains a full page night view of New York and symbolic charts printed in two colors to present the various phases of the company's activities. (2) The Peoples Gas Light & Coke Co. of Chicago has published its report on buff paper, using exceptionally large and readable type and the center spread of this booklet presents a symbolic drama of gas production, transmission, distribution, and utilization. (3) On the Pacific Coast, the Pacific Gas & Electric Co. produced an annual report which contained many large photographs and a map in color of the territory the company serves.

The publication of such booklets as these can only mean increased harmony and understanding between stockholder, management, and employee.

This Electrical Age?

NOT the least in the long list of sturdy misconceptions that have resisted the growing enlightenment of this modern world is that which states this is an electrical age. In no less an authority than a booklet "Investigation of Concentration of Economic Power," published by the Federal Trade Commision is found the refutation in these words: "potentially, marketed natural gas as a source of heat and energy is several times greater than (the nation's) present electric output . . . Figures from the Bureau of Mines for 1937, show a marketed production of natural gas in the United States of 2,407,620,000 M. c. f. . . . One M. c. f. of natural gas at an average of 1000 B. t.u. per cu. ft. is equivalent in theoretical energy to 300 kw. hr. of electricity. . . This means that 2 billion plus M c. f. of natural gas marketed in 1937 equals theoretically 722 billion plus kw. hr. of electric energy. Rating gas as utilized at present as 40 % in efficiency as compared to electricity, this gas represents an actual energy source equivalent to 289,000,000,000 plus kw. hrs. Electrical sales to ultimate consumers for 1937, as stated by the Edison Electric Institute, were just over 99,000,000,000 kw. hrs., or the natural gas marketed in 1937 was the source of nearly three times as much efficient energy as the entire electrical industry in the United States."

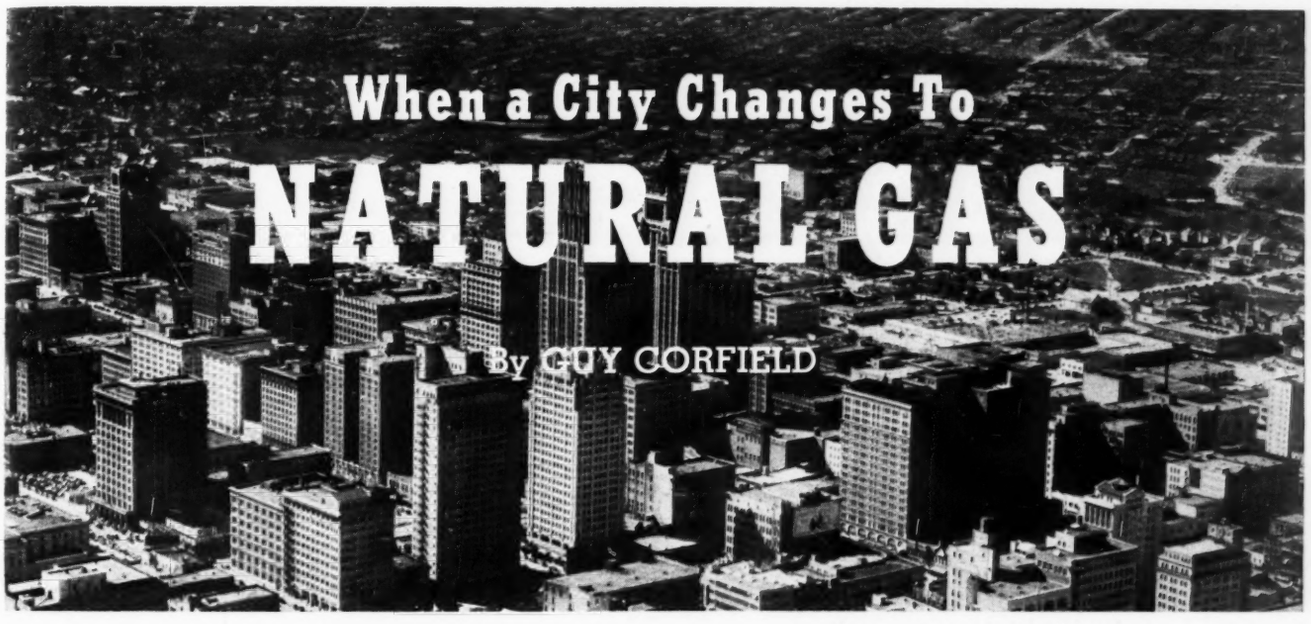
In GAS for June

THE JUNE issue of GAS will bring the 36th Annual Natural Gas Convention to your easy chair for leisurely reminiscence and study.

First will be a complete report, in story and pictures, of the events and personalities of the annual convention. Then, for the gas men who were unable to attend, GAS will present abstracts of several of the important papers presented before the convention sessions.

An exclusive feature of the June issue of GAS will be an article dealing with the interchangeability of gases in appliances. This study, by Frank Knoy, combustion engineer of the Municipal Gas Department, Long Beach, Calif., will give the practical operating results of an exhaustive series of tests on appliances using interchangeably natural gas and various mixtures of natural gas with butane, propane, and air.

Another exclusive feature of the June issue will be the second article in the "Changeover series." Guy Corfield, Technical Editor of GAS, in this second article will deal with the utilization aspects of changeover, taking up (1) Appliance Adjustment, (2) Organization for Adjustment, (3) Adjustment Operations, and (4) The following through of changeover procedures to the complete satisfaction of both company and consumer.



PART I: Technical and Distribution Aspects Of Replacing Manufactured with Natural Gas

APPROXIMATELY 15 years ago, when natural gas became available in significant quantities as a domestic fuel, distribution, utilization and sales engineers began to realize that a new era, in which natural gas was partially or wholly to replace manufactured gas in many areas, was developing in American gas practice. This replacement operation, with its accompanying engineering, public relations and sales problems is commonly referred to by the descriptive term of "Changeover."

The background of the various changeovers that have taken place has always been the availability of natural gas in adequate quantity and reasonable proximity to areas already supplied with manufactured gas, so that the new gas can be distributed at an equal or lower rate per therm. In many instances, also, the area involved has been growing so rapidly as to create a problem in supply of the former gas from the standpoints of both raw materials and plant capacity. Another very important factor has been the opportunity for conservation of natural gas as an invaluable national resource. Natural gas is unavoidably produced along with petroleum, and the solution of the problem of obtaining petroleum and at the same time complying with voluntary or mandatory conservation practices has been very considerably aided by the introduction of natural gas into many distribution areas.

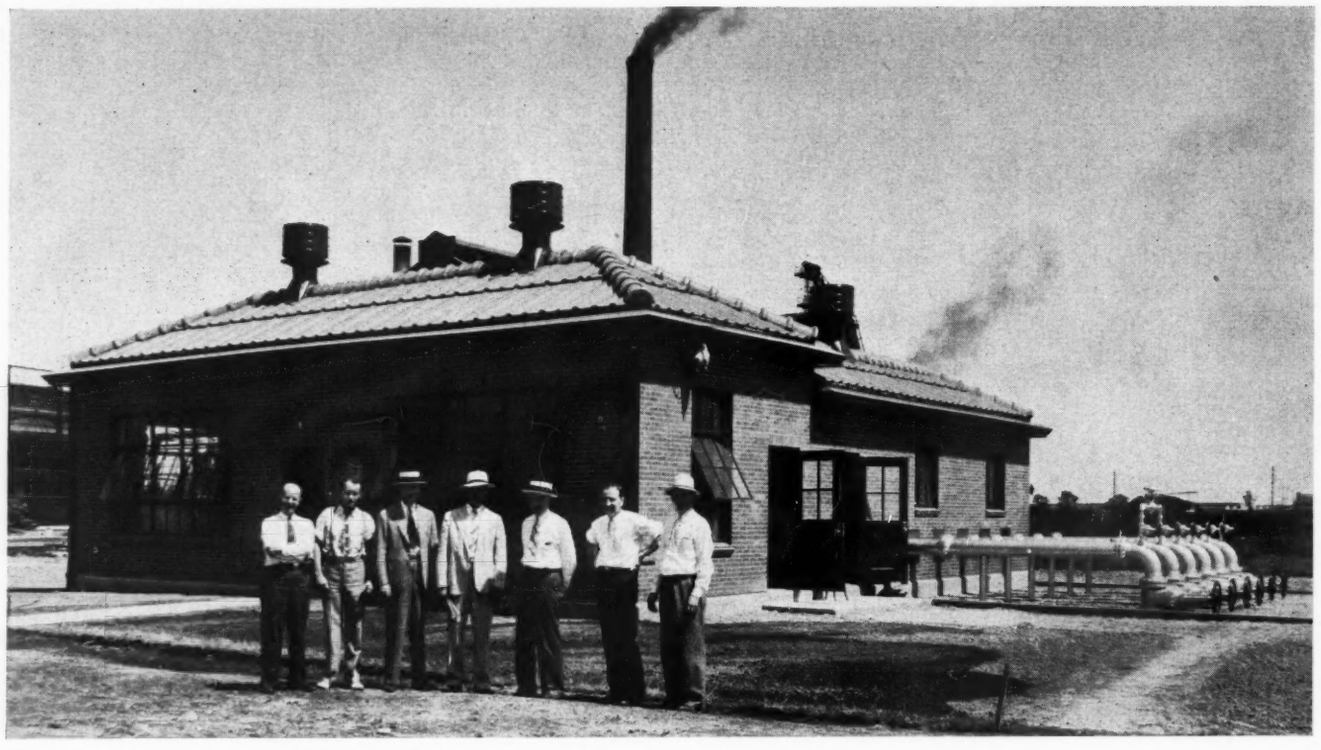
Inasmuch, also, as the loads on a domestic distribution system are peaked only during relatively short periods of the day and relatively few days in the winter months, natural gas transmission systems are developed and designed to take care of these peaks—assisted somewhat by "line pack" and local storage facilities—and at the same time supply large quantities of economical fuel for industrial use. This availability of a premium industrial fuel is advantageous not only to the area served but to the country in general, as is becoming increasingly evident at the present time with the upward surge of the national defense effort and the increasing use of industrial gas in production of war materials.

The above considerations, together with the continuing discovery of natural gas reserves which makes an adequate supply a certainty for many decades, confirm the wisdom of former changeovers and make it appear probable that others may soon follow.

I. TECHNICAL ASPECTS

A few moments' reflection will readily show that a changeover, even when involving only the transition from a manufactured to a "mixed" gas (i. e., part manufactured and part natural gas) is a rather profound change and may introduce many technical problems. One of the most fundamental of these problems is the interchangeability of gases from the standpoint of utilization in gas-burning appliances. This problem involves the satisfactory combustion of the new gas in the appliances already adjusted to and operating on the old gas. It also involves the satisfactory combustion of any standby or emergency gas, that may be introduced into the system to augment the new gas supply in times of emergency such as unprecedented cold spells, line breaks, etc., in the appliances as adjusted for the new gas.

1. *Severity of Changes in Characteristics and Types of Gas:* The interchangeability problem in fuel gases is more or less in proportion to the difference between the old and the new gas. In this connection, the most important characteristics of a gas are heating value, specific gravity, and rapidity of combustion or rate of flame propagation in the air-gas mixture. The heating value and the specific gravity —in that on it depends the amount of gas flowing through the burner orifice —together control the heating capacity of the appliance. The rate of flame propagation and the specific gravity— in that it also governs the injection of primary air to the burner—together control the burning behavior of the gas as to whether the flames will be satisfactory, or will flash back, lift, have



The meter station built by the Michigan Gas Transmission Corp. in 1936 as part of its construction program in equipping for the changeover from manufactured to natural gas. Standing beside it are (left to right): George T. Bentley, assistant to superintendent of manufacturing, Detroit City Gas Co. (now Michigan Consolidated Gas Co.); Cecil Van Gundy, Michigan Gas Transmission Corp.; G. S. Young, general manager, Michigan Gas Transmission; Henry Fink, superintendent of manufacturing, Detroit City Gas Co.; L. E. Ingham, assistant superintendent, Michigan Gas Transmission; William R. Fraser, chief chemist, Detroit City Gas; J. E. Overbeck, measurement engineer, Columbia Gas and electric, in charge of construction.

yellow tips or even actually smoke.

These characteristics are, of course, functions of the chemical composition of the various gases.

Table No. 1 gives typical analyses of fuel gases and Table No. 2 shows characteristics of fuel gas constituents. The approximate rate of flame propagation of a fuel gas can be calculated by adding together the products of the percentages of each constituent in the gas and the rate of flame propagation of this constituent. The value of the rate of flame propagation for illuminants may be considered the same as that given for ethylene.

It can be seen from the data on Tables No. 1 and 2 that very wide differences exist between extremes of gas composition, such as between carburetted water gas and high B.t.u. natural gas. The records of changeovers, to date, include both moderate and major changes in gas composition, and indicate that any degree of change can be handled with success if adequate study and preparation are made.

2. *Degree to Which Appliances Have to be Adjusted:* In general, any gas appliance can be made to operate reasonably well on any type of fuel gas although, if designed or adjusted for one type of gas, it may require varying degrees of adjustment or even redesign before it will operate on another gas of widely different characteristics. A modern gas appliance, as approved by the American Gas Association Testing Laboratories, will operate on manufactured, mixed or natural gas with only minor adjustments such as orifice and/or air shutter changes, when one gas is substituted for another. It is even flexible enough so that it may not need any adjustment for a rather decided change in gas type provided the two gases have compensative characteristics, as discussed in the next section. On the other hand, older types of appliances may need adjustment when a relatively slight change takes place, and if a profound change in the gas type is necessary, these older appliances may even require actual structural changes such as enlargement of burner ports or wider spacing between burners and heat absorbing surfaces, baffles, etc. Also, when a transition is made to or from liquefied petroleum gas, special adjustments or changes may be necessary. Finally, certain appliances with burners designed for a certain type of gas may need a burner change to properly accommodate a new gas.

It is obviously desirable, from both expense and customer-relation standpoints, to keep adjustment of appliances on the customer's premises to a minimum. Therefore, one of the first steps in the contemplation of a changeover is to examine both the practical and theoretical aspects of appliance adjustment, toward the end that the adjustment at the time of changeover be as simple as possible and that no further adjustment will be necessary when emergency or standby gas is introduced into the system.

3. *Technical Data Available on Interchangeability of Gases:* Considerable valuable data are available on both the theoretical and practical aspects of interchangeability of gases. In 1933 the American Gas Association published Report No. 689 of the American Gas Association Testing Laboratory, entitled "Mixed Gas Research." This report, which dealt with the utilization of various mixtures of natural gases and modified manufactured gases, developed a formula for determining limits in mixing city gases, and finished with a general summary of the results of the investigation which had been under way for the previous six years. A paper by F. E. Vandaveer (13) shows the effect on appliance operation of variation in gas pressure, and change

in gravity, heating value and chemical composition, for manufactured and natural gases. W. P. Cook (22) in discussing the same general subject, went into the behavior of propane and butane-air gases also. More recently a paper by R. M. Conner (28) stressed particularly the ability of appliances to accommodate variations in composition of gases without readjustment of orifices or air shutters. It reintroduced the basic A. G. A. Mixed Gas Formula which, because of its importance to the general subject, is herewith reproduced.

The extent of variations which can be safely tolerated in natural gas composition is reliably established by the A.G.A. Mixed Gas Formula:

$$C = \frac{h_t A_t d_a}{h_a A_a d_t} + \left\{ \frac{h_a A_a}{5000\, E_a\, F_a} - \frac{h_t A_t}{5000\, E_t\, F_t} \right\}$$

C = index of change in performance of appliances. For continued satisfactory performance of appliances when the gas on which they have been adjusted to perform satisfactorily (adjustment gas) is to be replaced by another gas (test gas) the value of C should be held between 0.85 and 1.15,

h = gross or total heating value, B.t.u. per cu. ft.

A = air theoretically required for complete combustion, cu. ft. per cu. ft. of gas,

d = specific gravity (air = 1.0),

WITH THIS ARTICLE, G A S is presenting the first of a series of articles by Mr. Corfield dealing with the problems of changing over a manufactured gas distribution system to natural gas service. This first article, which considers the technical and distribution aspects of such a changeover, will be followed in the June issue of G A S with an article covering the various phases of the utilization aspects of changeover. Briefly, the second article will deal with (1) the Adjustment of Appliances, (2) the Training of Manpower and the Organization of Supplies, (3) the Formation of Plans for Adjustment Operations, and, (4) the Following Through of Changeover Procedures with regard to complaints, orders, leaks and high bills to the satisfaction of both company and consumer. The third article in this series, scheduled for publication in July, will concern itself with the equipment used in changeover operations and will present also a historical summary of such operations in the United States.

GUY CORFIELD, Technical Editor of G A S, graduated in 1924 from the University of British Columbia with the degree of Bachelor of Applied Science in Chemical Engineering. Since his connection with the gas industry in 1924 he has been engaged in technical and research activities, and for the past six years has been research engineer for the Southern California Gas Co. of Los Angeles. In 1933 Mr. Corfield was chairman of the Technical Section of the Pacific Coast Gas Association. Each year for the past decade he has been active in committee work in the Technical Section of the American Gas Association.

E = the heat capacity of the theoretical products of combustion 60° F. to 1600° F., B.t.u.,
= 0.029V CO_2 + 0.023V H_2O + 0.0189V N_2, where V = volume of each product as indicated by the respective subscripts CO_2, H_2O and N_2, formed by the combustion of 1 cu. ft. of gas with the air theoretically required for complete combustion, cu. ft., and 0.029, 0.023, and 0.0189 = heat capacity of each product of combustion 60° F. to 1600° F., B.t.u. per cu. ft.,

F = summation of the products of the mol fraction and a constant resolving each combustible constituent to the basis of equivalent free hydrogen,
= H_2 + 5.36 CO + 27.3 CH_4 + 38.7 C_2H_6 + 80.8 C_4H_{10} + 7.4 C_2H_2 + 15.0 C_2H_4 + 27.4 C_3H_6 + 63.3 C_3H_8 + 78.0 C_6H_6
where H_2, CO. CH_4, etc. = mol fraction of each combustible constituent in the gas, and

a and t = subscripts designating the adjustment gas and test gas respectively,

provided the value for the index of interchangeability "C," as calculated, does not exceed 1.15 nor fall below 0.85.

A study of these articles will show what characteristics are necessary in the new gas to make it interchangeable with the old gas, or indicate the degree of adjustment necessary to convert appliances operating on the old gas so that they can satisfactorily handle the

TABLE NO. 1. TYPICAL ANALYSES OF FUEL GASES

(Excluding L. P. G. and L. P. G.-Air Mixtures)

	Composition—Percent by Volume								*Specific*	*B.t.u., Total per*
Type of Gas	H_2	CO	CH_4	C_2H_6	*Ill.**	CO_2	N_2	O_2	*Gravity*	*Std. Cu. Ft. Saturated*
Natural	....	....	84.2	14.8	....	....	1.0	...	0.63	1100
Natural	....	....	63.1	35.4	....	...	1.5	...	0.73	1252
Natural	....	....	23.0	41.5	....	...	35.5	...	0.90	959
Natural	....	....	78.6	10.3	....	9.7	1.4	...	0.70	965
Blast Furnace	1.2	27.2	....	....	....	8.0	63.6	...	1.00	90
Producer (Coke)	10.0	30.0	1.5	....	....	3.5	54.5	0.5	0.88	145
Carburetted Water	28.5	29.8	19.8	....	15.8	4.8	1.3	...	0.71	719
Carburetted Water	34.8	30.6	15.0	....	11.5	4.2	3.9	...	0.65	595
Carburetted Water	45.2	36.5	5.2	....	4.0	6.0	3.1	...	0.59	400
Blue Water	50.5	40.2	1.2	....	....	4.4	3.8	...	0.54	300
Coal	51.5	6.8	32.0	....	3.9	1.7	3.5	0.6	0.41	607
Coal and Coke Oven	49.3	9.4	28.5	....	3.5	2.3	6.5	0.6	0.43	545
Oil (Pacific Coast)	50.7	10.2	26.0	....	3.9	4.4	4.3	0.5	0.45	541
Oil (Pacific Coast)	21.7	3.2	48.0	....	20.7	1.9	4.3	0.2	0.51	975
"Reformed" Natural	43.5	14.5	29.7	1.7	1.0	2.4	7.0	0.2	0.47	527
Dayton Oil Producer	1.5	5.5	8.7	....	15.9	6.1	61.8	0.5	1.06	502
Oil (Refinery)	13.1	1.2	23.3	21.9	39.6	0.2	0.5	0.2	1.02	1475

*Illuminants, Cn H_{2n}. A mixture of ethylene, propylene and (possibly) benzene.

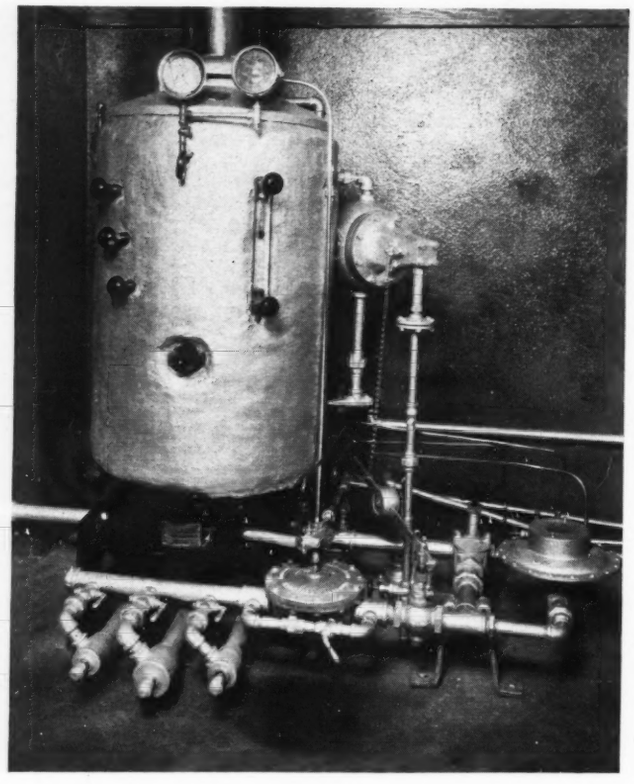


Fig. 1. Boiler and controls for humidifying gas, installed at Mobile, Ala., by Atlanta Gas Light Co.

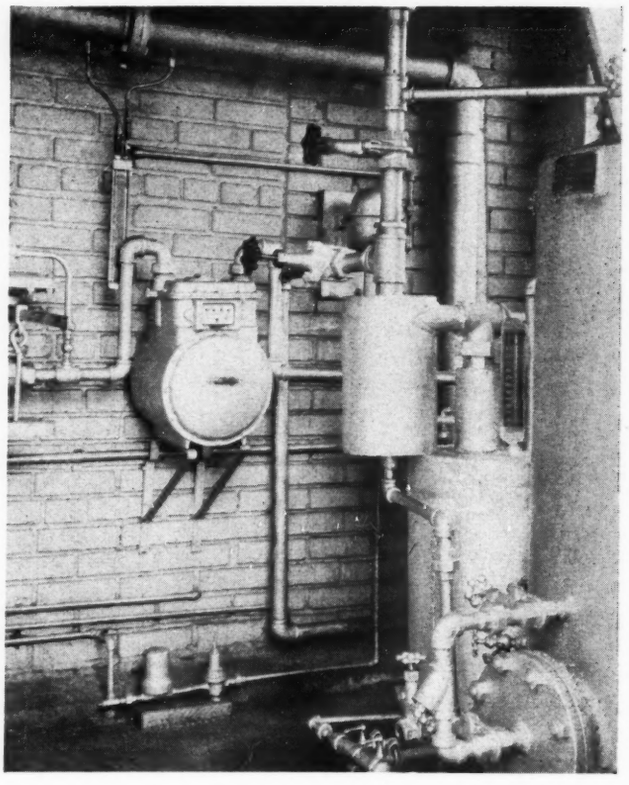


Fig. 2. Hot oil fogging equipment, installed at Mobile, Ala., by Atlanta Gas Light Co.

proposed new supply. As a confirmatory step, when the new gas is decided upon or alternatives are being considered, it is highly desirable to obtain a supply of the proposed new gas or gases, in sufficient quantity to permit of a careful laboratory study. This study should consist of setting up a group of appliances typical of those in operation in the area of the proposed changeover, adjusting them for the old (existing) gas and then turning in the new gas and watching the performance. In this way the necessary adjustments can be observed or worked out, and plans made accordingly.

II. DISTRIBUTION ASPECTS

Ordinarily, when a changeover is being contemplated, the adjustment of appliances comes first to mind; and undoubtedly the bulk of the incidental work, and certainly the most spectacular portion, falls to the lot of the Utilization Engineer. However, there are numerous aspects of a changeover that involve the Distribution Engineer also, and successful operations depend on close cooperation between the two departments. The most important engineering considerations that arise in the operation of the distribution system will now be discussed.

1. *Point of Entry of New Supply to Distribution System:* If the new gas supply can be conducted to and distributed from the former points of entry to the distribution system, i. e., from the manufactured gas plants, very little if any redesign of the system may be necessary. Apart from the change in consumption and flow characteristics, due to change in heating value and specific gravity respectively, the system can operate with the same regulatory and pressure control equipment. Also, the initial substitution of the new gas can be made very conveniently at these normal points of entry. However, if part or all of the new gas is most economically available at more remote points, such as near the outskirts or one end or corner, at least the adjacent portions of the system may have to be redesigned to accomodate the reversed direction and increased volume of flow. It may also be somewhat difficult to arrange the initial introduction of the new gas in a satisfactory manner, particularly if zone changeover methods (to be discussed later) are employed.

2. *Change in Gas by One or More Districts, or Steps:* There are numerous ways in which the new gas may be introduced into the system depending upon the size and shape of the area, the severity of the gas change and the plan adopted for appliance inspection and adjustment.

The area may be divided into several zones or districts which are changed-over one at a time. (7), (8), (14), (23), (25). This necessitates the proper arrangement of valves and piping so that each district can be isolated from those adjacent and receive, in the selected order, its supply of the new gas. To expedite the entry of the new gas into a given district and to purge out the old gas, so that appliance adjusters can start working throughout the district without delay, arrangements should be made to allow the escape of the old gas through temporary risers where the gas can be harmlessly burned (14), (23), (25).

In some instances it has been found possible to change over the entire area without subdivision, by resorting to "step" changes in B.t.u. and/or service pressure, and making one or more appliance adjustments corresponding to the steps (20), (21), (25), (28). When these steps involve only a change in B.t.u., the problems in the distribution system proper may not be difficult, but the provision and introduction of the intermediate gas, which will probably be a mixture of the old and the new, will require careful manipulation. When the steps consist of or include a change in service pressure, consider-

able work will be needed in the distribution system to see that the changed pressures do not get out of control.

In general, such changes from the normal method of operation of the system require very careful preliminary planning, and extreme vigilance during execution.

3. *Drying Out of Mains, Services, Joints, Valve Stems, etc., Causing Leakage:* Many changeovers involve the substitution of a "dry" natural gas for a "wet" or "moist" manufactured or mixed gas. The terms "dry," "wet" and "moist" are used not only in reference to water or water vapor, but also to oil or oil vapor, and to volatile-condensible semi-solids or solids such as napthalene, tar or "gums." A wet or moist gas may deposit and/or maintain such substances throughout the distribution system; when a dry gas follows, it will remove some of these substances and cause others to shrink. The degree of this change depends on the type of the construction materials in the distribution system, the past history of the system as regards type of gas served and internal deposits, and the severity of the wet-to-dry transformation. It has been the experience of several companies that this drying and shrinking action tends to cause leakage from pinholes, threads and welds, from cast iron bell-and-spigot joints, from valve stem packings, gaskets, etc.

4. *Drying Out of Meters and Regulators, Causing Erratic Performance:* This same drying action may produce an effect on existing leather diaphragms of meters and regulators, by removing water, light oils and other volatile substances from the leather with resulting shrinkage and tendency to become hard and even brittle. In meters, this drying may cause erratic registration either by restriction of the movement of the diaphragms or reduction in the size of the gas chambers, or cracking and leakage of the leather. In regulators, the movement of the diaphragm may be similarly restricted to cause impaired operation, or the diaphragm may crack and leak.

5. *Drying Out of Mains and Services, Releasing "Dust":* This drying action already referred to, causing shrinkage of solid deposits in the mains and services, eventually results in the release of such solid deposits in the form of "dust." This dust consists largely of iron oxide or rust, formed by release of mill scale from the pipe walls or corrosion of the pipe itself; to a lesser degree it may contain carbonaceous matter from a manufactured gas plant, or soil and other external matter introduced into and left in the pipes during storage and installation. This dust may vary in size from relatively large lumps to microscopic particles, so minute that they can reach and even pass through the smallest domestic appliance pilot orifice. Considerable and continued difficulty may be encountered from dust in a distribution system, as it is often present in large quantities, and may be continuously produced over a long period of years by the progressive release and disintegration of scale from the pipe walls. The greatest difficulty is usually encountered by the utilization department, in that the dust is picked up by the gas with resultant pluggage of controls and orifices of gas burning equipment. However, the operation of meters and regulators may also be impaired, and there may even be stoppages in services and small mains.

6. *Effect of Gas Velocity, and Reversal of Flow, on Movement of Dust:* Considering a gas pipe containing loose dust, the amount of dust that can be picked up and transported depends on the gas density, pressure, and velocity. R. G. Holman and N. L. Hoff have presented some experimental data in this connection (27). In general, the high velocities and often high pressures of winter months and peak load days, or abnormally high velocities produced by routing large quantities of gas through small mains, are the conditions under which dust trouble may be expected. It is also well established that a reversal of flow may stir up dust that would otherwise remain dormant, and that mains in which the direction of flow reverses frequently are more likely to produce dust than those in which the gas flow is uni-directional. The above factors can be used to estimate the probable difficulty that may be encountered.

7. *Means of Avoiding or Controlling "Drying-Out" or "Velocity" Difficulties:* The history of changeover practices reveals the use of two general types of procedure for coping with distribution difficulties caused by drying-out effects, and, inasmuch as each changeover presents its own peculiar set of variables and problems, it appears that it is more a question of deciding which type of procedure best fits the situation under consideration, than of arbitrarily selecting one procedure as being superior under all circumstances. The decision as to which type of procedure to adopt will be guided by knowledge of the physical condition of the distribution system, the severity of the change from wetness to dryness, and financial policies as to desired expenditures for leakage surveys and repairs, renewal or reconstruction of equipment, etc.

One type of procedure is to forestall the drying-out effect by rehydration and oil fogging, so as to reduce the dryness of the new gas and, if carried far enough, to deposit liquid water and oil throughout the distribution system (5), (11), (12), (25) (26). The advantage of this procedure is that it maintains the distribution system in approximately the same condition, as regards moisture, as it was prior to the advent of the new gas. The disadvantage is that it entails continuous opera-

TABLE NO. 2. CHARACTERISTICS OF FUEL GAS CONSTITUENTS

Gas Constituents	*B.t.u., total per Std. Cu.Ft. Sat.*	*Specific Gravity*	*Rate of Flame Propagation, Approx. Max., Ft. per Sec., 1 Inch Tube*
Hydrogen, H_2	319.4	0.0695	16.0
Carbon Monoxide, CO	316.1	0.967	3.0
Methane, CH_4	997.4	0.555	2.2
Ethane, C_2H_6	1759.0	1.047	2.8
Propane, C_3H_8	2528.0	1.550	2.7
n-Butane, C_4H_{10}	3336.0	2.077	2.7
iso-Butane, C_4H_{10}	3307.0	2.065	2.7
Ethylene, C_2H_4	1587	0.974	4.7
Propylene, C_3H_6	2339	1.479	...
Benzene, C_6H_6	3693	....	...
Carbon Dioxide, CO_2	....	1.529	...
Oxygen, O_2	....	1.105	...
Nitrogen, N_2	....	0.972	...

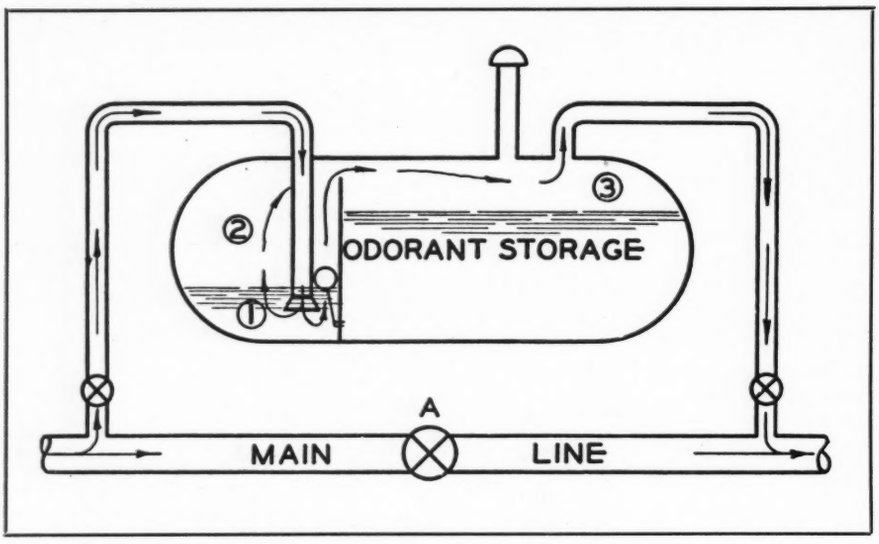


Fig. 3. By-pass odorizer, liquid seal type.

tion and maintenance. Water may be introduced into the gas as steam (see Fig. 1), or the gas may be hydrated by spraying, scrubbing or bubbling. Oil may be introduced, directly into the lines as a fog by atomizing or spray nozzles using high pressure gas, or steam; oil may be injected by a "hot fogger" (see Fig. 2), whereby it is heated to the vaporizing point and the vapor removed from the fogger by "sweep gas" and carried into the main where it subsequently condenses into fog and travels into the system; or oil may be injected by a "cold fogger," in which apparatus a gas-actuated nozzle produces a fog which travels through a settling chamber where the largest particles are coalesced and removed, and thence into the distribution system. Hot and cold fogging apparatus is manufactured by the Western Gas Construction Co. It should be realized that both water and oil fog will evaporate into the gas to a degree dependent on the initial dryness of the gas, and its pressure and temperature. Also that as the gas proceeds on its way through the mains its pressure decreases and therefore its capacity for absorption increases. Also that it is only the small particles of fog that can be carried any great distance, as larger particles will rapidly drop out by coalescence and/or impingement on the pipe walls. Therefore, to obtain actual liquid condensation within the distribution system, particularly at its extremities where the pressure is low, requires relatively large quantities of good quality (small particle size) fog, and injection at numerous points in the system if covering a large area. This procedure may be assisted, particularly with respect to caulked bell-and-spigot cast iron joints, by the application of liquids designed to penetrate into the joints and swell or otherwise retain or renew the effectiveness of the jute as a sealing medium. These liquids may be sprayed into the mains, or injected at high points and allowed to run along the mains by gravity, or injected directly into the joints. Carboseal and Saturseal are liquids that have been developed for this purpose.

The other type of procedure is to make no attempt to internally condition the system to prevent drying out and, if leakage and other difficulties do develop, to remedy them in appropriate ways as expeditiously as possible. The advantage of this procedure is that, with difficulties kept under control and finally reduced to a practical minimum, this phase of the operation ceases and has not become a permanent procedure and expense. The disadvantage is possible high cost during at least the initial stages, and also possible inability to keep the difficulties satisfactorily under control at all times while remedial measures are being applied. Remedial measures are careful leakage observation and surveys, followed by repairs of pipe leaks and joint leaks, tightening of packing glands or renewal of packing, etc.; renewing of meter and regulator diaphragms with materials properly treated to operate in the new gas; and control of dust by one of several methods.

Dust control may develop into a difficult problem, particularly where the dust originally existed in or has penetrated to the extremities of the system. Dust scrubbers or filters (6), installed on trunk lines or at district regulator stations, will give considerable primary control, and filters can be further installed at more remote locations in the system and, in aggravated cases, on house lines, at appliances and even on pilot lines. Trunk line and district regulator station sizes of scrubbers are made by the Blaw-Knox Co. and the Fluor Corp.; filters of various sizes are provided by the Reliance Regulator Corp. Oil fogging can also be used to control dust released by drying-out of the system, subject to the requirements and limitations already mentioned. Relief can also be obtained by "blowing" the mains, services and house lines to atmosphere, at the highest velocity obtainable, whenever an opportunity is afforded. Also, as previously mentioned, reduction of velocity and elimination of reversible flow will help.

A procedure has been followed in some instances which is a combination of the two already discussed, whereby a modified program of rehydration and

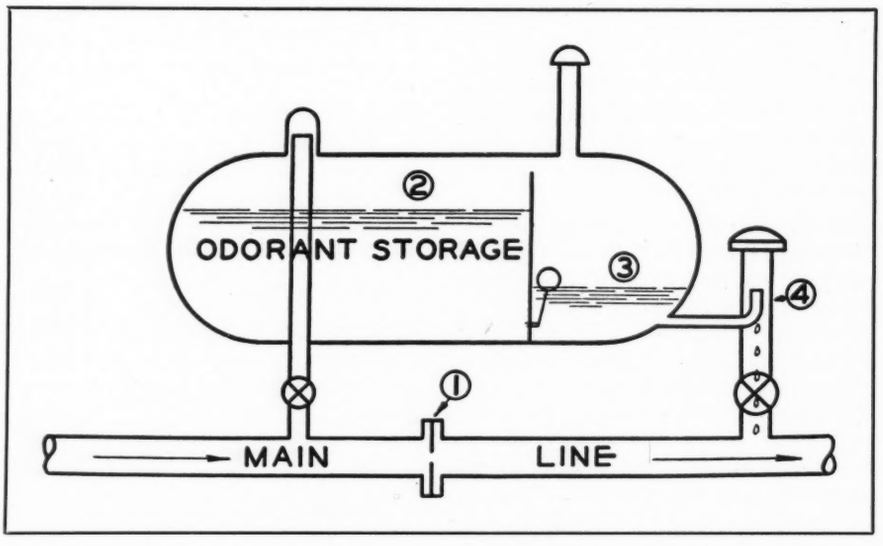


Fig. 4. Liquid injection odorizer, differential control type, with constant liquid heat.

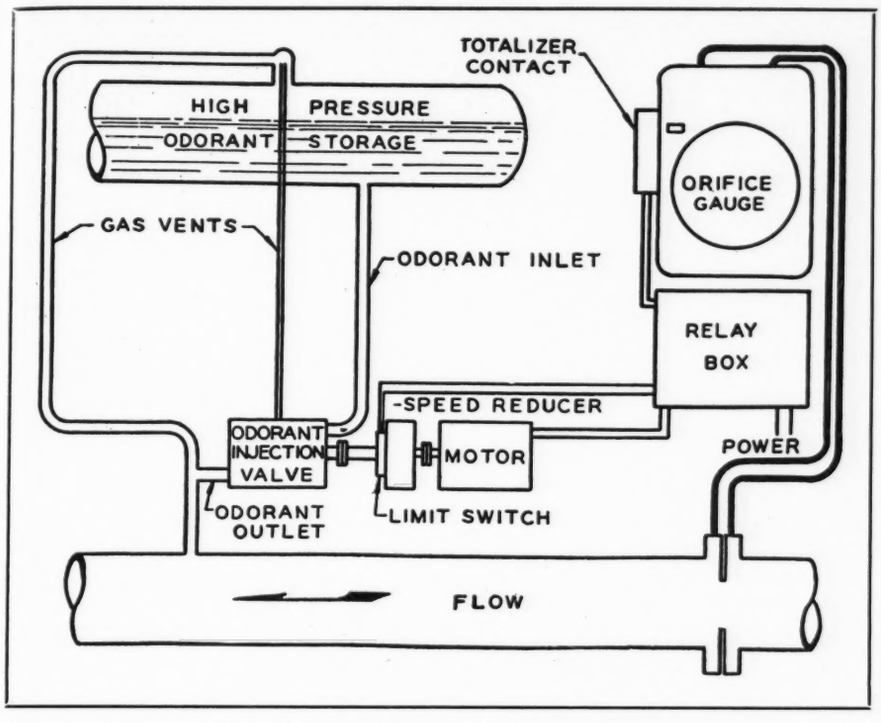


Fig. 5. Pressure differential, controlled odorizer.

oil fogging has been instituted to obtain partial or temporary relief from drying-out difficulties. In this manner the urgency of remedial measures can be controlled, and the work done by sections of the system, or by a smaller force of workmen, or over a longer period of time.

8. *Odorization:* Natural gas, when mixed with air in small percentages (near the lower explosive limit which is approximately 5% gas in air), is practically odorless, in contrast with manufactured gas which has a noticeable and distinctive odor at similar concentrations. From the standpoint of leakage detection and safety, it has become generally recognized as desirable to add an odor to natural gas used for domestic purposes. Therefore, consideration of this should be given when natural gas replaces manufactured or mixed gas in a changeover. The general requirements of a satisfactory odorant are as follows:

1. Non-corrosive.
2. Non-toxic.
3. Odor noticeable but not unpleasant or irritating.
4. Odor similar to manufactured gas.
5. Sufficiently concentrated that large quantities need not be handled.
6. Sufficiently volatile to permit treatment of gas at high pressure.
7. Reasonable in price.

Odorant is usually injected into gas in an amount such as to provide a noticeable odor when the gas is mixed with air at a concentration considerably below the lower explosive limit. The two odorants now in general use are liquids containing organic sulphur compounds as the odorous ingredient. One of these liquids is Pentalarm, manufactured by Sharples Chemicals Inc. of Philadelphia, Pa. (formerly The Sharples Solvents Corp.); another is Calodorant, made by Standard Oil Co.

Several general types of apparatus are used for the controlled and automatic addition or injection of these odorants into the gas. One commonly-used type, particularly when relatively small volumes of gas are involved, is the by-pass odorizer, in which the gas is partially or completely by-passed through or over the liquid odorant which it picks up by absorption. This type is illustrated in Fig. 3.

A modification of this type makes use of wicks to bring the odorant in contact with the gas. Another type is the differential-controlled odorizer, wherein the liquid flows into the gas from a constant-head source under the impulse of a differential pressure developed by an orifice in the gas line. This type is shown in Fig. 4. A third type is the pressure-differential-controlled odorizer, which makes use of the registration of an integrating orifice meter gage installed on the gas line. The rotation of the gage integrator, as it registers the gas passing through the line, is translated by a cam into an electrical impulse which actuates mechanism which in turn introduces a measured quantity of odorant into the gas line at each rotation of the cam shaft. This type is illustrated in Fig. 5.

(This is the first of a series of articles by Mr. Corfield on the subject of changeover from manufactured to natural gas. The second article in this series will appear in the June issue of GAS.)

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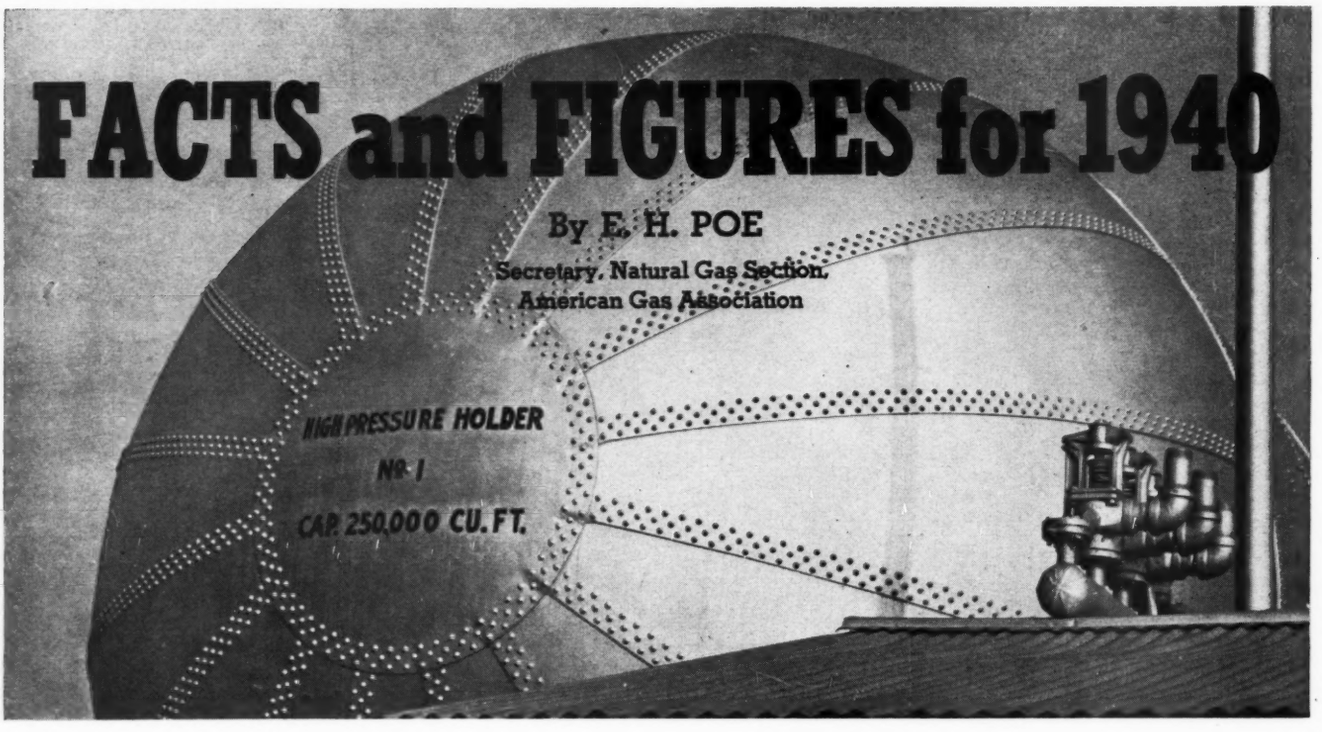
29. Changeover to Propane-Air Gas at Brainerd, Minn., by Robt. L. Rundorff, *GAS*, July, 1940, p. 25.

30. Changeover from 550 to 1000 B.t.u. Butane-Air Gas, by A. R. Bailey, *GAS*, December, 1940, p. 30.



FACTS and FIGURES for 1940

By E. H. POE
Secretary, Natural Gas Section,
American Gas Association

PRELIMINARY estimates indicate that 2,600,000,000,000 (2.6 trillion) cu. ft. of natural gas were produced during 1940. This figure includes amounts used for the manufacture of carbon black and for field purposes.

The total utility sales of natural gas amounted to 1,441,354,100,000 cu. ft. This was an increase of 8.9% over the utility sales of 1939. Decided increases in all classes of these sales were recorded. Table No. 1, showing customers, sales and revenue for 1940, as compared to those of 1939, illustrates the continuance of the industry's record of progress and expansion. Figs. 1 and 2 give the sales and revenue statistics for the natural gas utility for the years 1929 to 1940, inclusive.

Natural gas service, at the end of 1940, was available in towns and cities with an aggregate population in excess of 35 million people. The total customers served, numbered 7,763,400, or the largest number of services ever connected to the mains of the industry. These customers paid $488,117,000 in revenues throughout the year.

In order to maintain the high degree of service to which their customers have become accustomed, the services of 65,300 workers have been employed. The aggregate payroll of these employes amounted to $105,342,000. An interesting sidelight, demonstrating a contribution towards better living and working conditions for their employees, lies in the fact that today the average worker receives $4.31 more, and works 10 hours per week less than he did in the peak year of 1929. (See Table No. 2.)

The total investment in the natural gas industry is $2,414,490,000. In recent years rather surprising comparisons were made when this figure was compared to similar figures of other industries. For example, last year it was pointed out that investment in the natural gas industry almost doubled the amount of capital employed in the manufacture of automobiles. This was done to illustrate and clarify an often mistaken idea that as an industry, natural gas assumes proportions far in excess of the average person's conception.

It should be further pointed out that 190,300 miles of pipe line is utilized in the gathering, transmitting and distributing of natural gas.

Approximately 183 billion cu. ft. of

TABLE No. 1. NATURAL GAS INDUSTRY CUSTOMERS' SALES, AND REVENUE (1940)

	1940	*1939*	*Per Cent Change*
Customers			
Residential	7,156,700	6,892,400	+ 3.8
Commercial	560,600	543,000	+ 3.2
Industrial	43,700	41,400	+ 5.6
Miscellaneous	2,400	2,200	....
Total	7,763,400	7,479,000	+ 3.8
Gas Sales (M c.f.)			
Residential	419,424,900	371,603,000	+12.9
Commercial	122,589,800	108,964,000	+12.5
Industrial	880,901,000	826,843,000	+ 6.5
Miscellaneous	18,438,400	15,948,000	....
Total	1,441,354,100	1,323,358,000	+ 8.9
Revenue (Dollars)			
Residential	280,359,100	254,150,000	+10.3
Commercial	55,419,400	50,059,000	+10.7
Industrial	149,579,900	139,243,000	+ 7.4
Miscellaneous	2,758,600	2,519,000	....
Total	488,117,000	445,971,000	+ 9.5

*Statistical Department, American Gas Association, March 24, 1941.

natural gas, used as a fuel for generating electric power, is included in the 1940 industrial sales. Figures available from the 1939 supplement to Electric Power Statistics, published by the Federal Power Commission, Washington, reveal that in 1939, 11,787,871 thousands of kilowatt-hours were produced by the use of gas.

Regarding this gas useage, the data for 1939, shown in Table No. 3, were prepared by applying the weighted average B.t.u. values for each type of fuel, as determined for 1938, to the 1939 fuel consumption and electric energy production data. For this reason minor changes in the 1939 data may be necessary when additional information is available showing the average heat content of each unit of fuel consumed during that year.

What the induction of natural gas service in communities formerly served with manufactured gas has meant in savings to the consumer, has been discussed time and again. The consumer's reaction is somewhat illustrated in figures compiled concerning the use of gas in newly constructed one and two-family homes throughout the areas served by natural gas. These figures are preliminary and cover the construction of 95,612 new dwellings. The table below shows the percent figures for those houses utilizing gas appliances.

Cooking	93.8%
Water heating	95.2%
House heating	87.0%
Refrigeration	12.8%

Comparative data on appliance sales for the years 1939 and 1940 are shown in Table No. 4.

Considering that revenue from domestic uses amounts to 57% of the total revenue received from utility sales, and coupling this with the fact that these homes represent the most modern conception of design and serviceability, it affords additional assurance of the continued progress and expansion of the natural gas industry.

TABLE No. 2. EMPLOYEES AND PAYROLL OF NATURAL GAS INDUSTRY IN THE UNITED STATES (1929-1939)

Year	*Number of Employees*	*Annual Payroll*	*Average No. of Hours Worked Per Week*	*Average Weekly Pay*
1929	68,500	$ 95,116,000	49	$26.71
1930	60,800	85,096,000	49	26.92
1931	54,400	76,970,000	46	27.21
1932	51,600	70,595,000	46	26.31
1933	52,500	68,668,000	43	25.15
1934	57,300	79,773,000	39	26.77
1935	59,200	87,695,000	40	28.48
1936	65,800	95,913,000	39	28.04
1937	66,300	99,043,000	40	28.73
1938	64,000	103,488,000	40	31.10
1939	65,300	105,342,000	39	31.02

Statistical Department, American Gas Association, March 24, 1941.

TABLE No. 3. SUMMARY OF DATA FOR GAS CONSUMED FOR PRODUCTION OF ELECTRIC ENERGY DURING 1939*

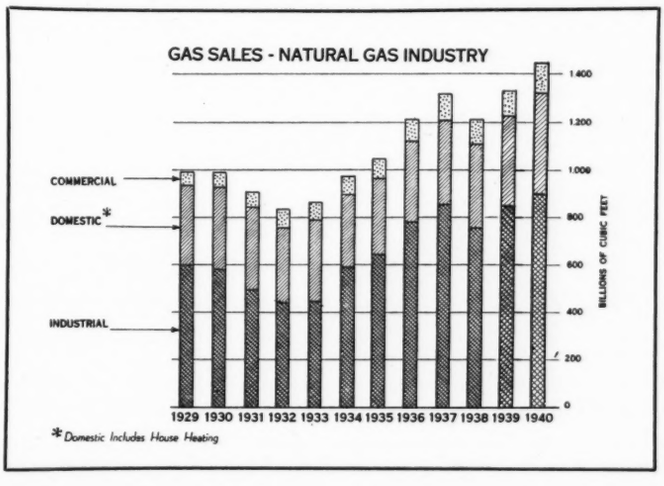
Division[1]	*Consumption (M Cu. Ft.)*	*Weighted Av. B.t.u. per Cu. Ft.*	*Thousands of Kwh. Produced*	*Cu.Ft. per Kwh.*	*Heat Rate B.t.u. per Kwh.*
United States	191,130,940	1,045	11,787,871	16.2	16,944
Middle Atlantic	4,451,535	1,021	217,601	20.5	20,887
East North Central	16,003,212	1,029	1,172,794	13.6	14,041
West North Central	41,571,477	1,035	2,041,122	20.4	21,080
South Atlantic	3,680,694	990	251,116	14.7	14,511
East South Central	7,458,003	930	350,595	21.3	19,783
West South Central	85,301,177	1,058	5,626,278	15.2	16,041
Mountain	9,503,445	1,017	506,705	18.8	19,074
Pacific	23,161,397	1,163	1,621,660	14.3	16,611

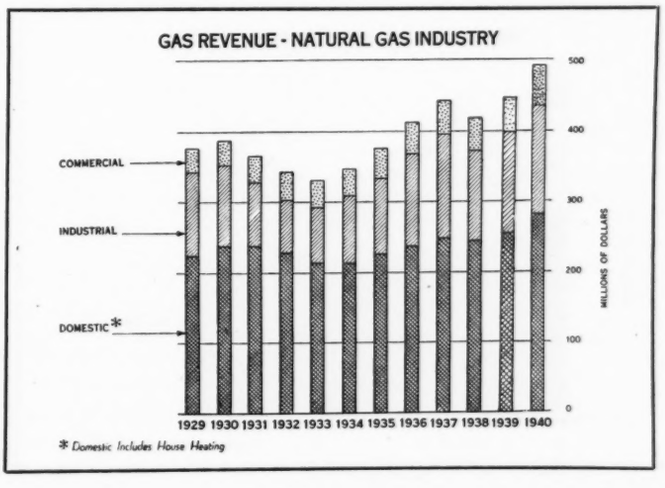
[1]No consumption of gas reported for New England Division.

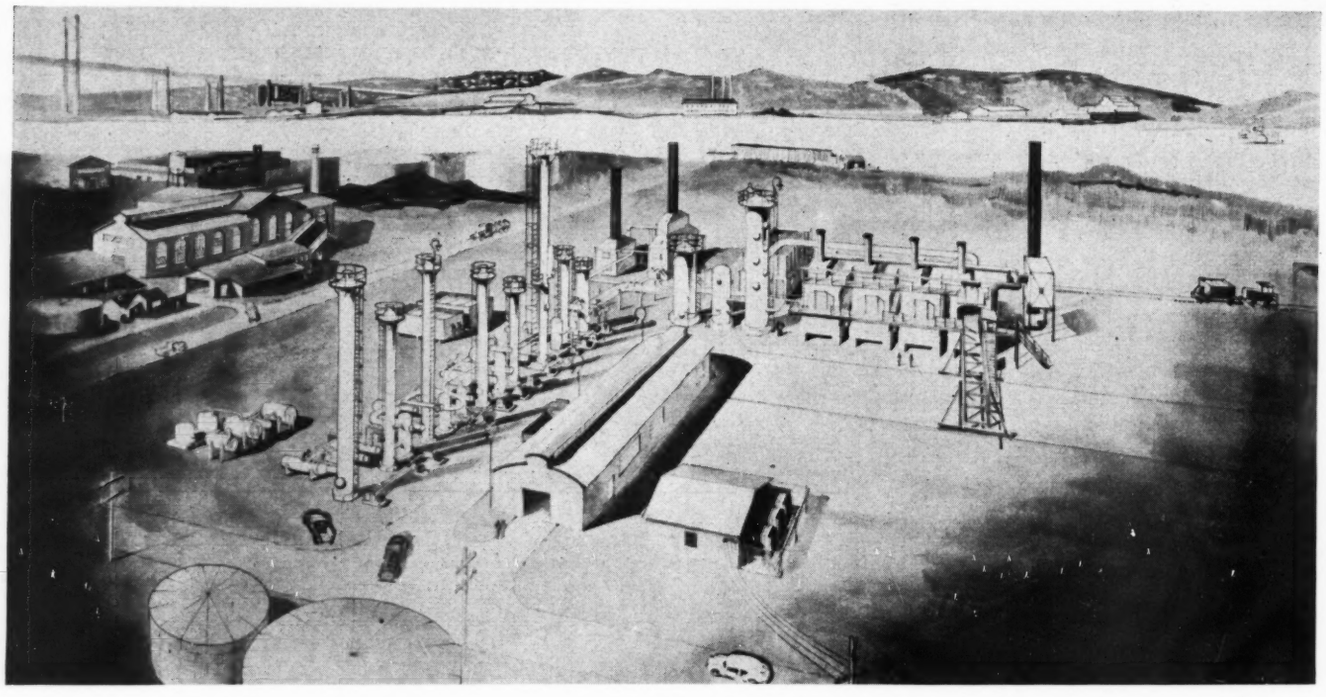
*From the "Supplement to Electric Power Statistics, 1939," published by the Federal Power Commission, Washington.

TABLE No. 4. COMPARATIVE DATA ON APPLIANCE SALES

	1940	*1939*	*Decrease*
Domestic gas customers served (Millions of gas customers)	16.64	16.22	+ 2.6
Total families provided for in new dwellings (All reporting cities of 1000 population or over)	348,645	307,690	+ 13.3
Shipments of gas ranges (Expanded to 100% of the industry from reports received by A. G. A. E. M.)	1,742,500	1,500,900	+ 16.1
Shipments of electric ranges (As reported to N. E. M. A.)	404,239	296,846	+ 36.2
Shipments of gas-fired water heaters (As reported to A. G. A. E. M. by 95% of the automatic gas water heater industry.)	492,453	449,101	+ 9.7
Shipments of electric water heaters (As reported to N. E. M. A.)	98,005	80,777	+ 21.3







This sketch shows how the new $1,500,000 addition to the chemical and gas manufacturing plant of Portland Gas & Coke Co. will look when completed this year. At the left is the oil refinery equipment, for the recovery principally of benzol, toluol, xylol, and solvent naphthas, and at the right background is the battery of four Knowles coke ovens for recovery of petroleum coke, lampblack, tar. At the left is the gas company's present works.

The Latest in Chemical Plants

THE first chemical and gas manufacturing plant of its kind—the result of seven years of intensive research by gas company chemists and engineers, will soon be under construction by Portland Gas & Coke Co., Portland, Ore., according to an announcement last month by Paul B. McKee, president of the company.

The new $1,500,000 plant, to be built adjacent to the present gas works will be the latest and most advanced installation and operation of its type—and will probably draw gas engineers from all over the world to see how it works, as its present chemical and gas manufacturing plant has attracted gas men from a score of countries.

Keeping place with the demands of the times, this progressive gas- company now is expanding its chemical manufacturing (1) to take advantage of the "chemical" age in which we are living, (2) to tie in its production to furnish materials for national defense plants, (3) to furnish materials for new industries recently locating there or coming to that area, (4) to increase its revenues by manufacturing chemicals for which there is a constant demand —peacetime or wartime, (5) to increase its gas making capacity in order to meet the growing demands for gas service in the expanding Portland area.

The gas company's plans for its new plant are keyed in with the recent industrial progress of the Pacific Northwest which has brought investment of more than $25,000,000 in new Portland plants alone.

Main products of the new plant will be:

Petroleum coke, with 21,000 tons produced annually. This is an important direct tie-in with national defense in that supplies of petroleum coke will be made available for the metallurgical plants and foundries in Portland and the Pacific Northwest working on national defense orders. There is now no available supply of this coke from that area. It is the type used for making electrodes for aluminum reduction plants. For instance, approximately .7 pound of carbon is consumed in the manufacture of every pound of aluminum. Rapid development of the Columbia River area as an aluminum center brings a large potential market for this electrode material.

Approximately 6,140,000 gals. of "light" oils and tar for many varied uses in industrial plants will be produced annually. These include toluol, a national defense material, because of the demand from munitions factories; benzol, which is blended into high-test anti-knock motor fuel; solvent naphthas and xylol which are used in the paint and rubber industries; and tar which is widely used as a non-skid surfacing for roads, streets and airport runways under the trade name Gasco roadbinder. Other chemicals may be recovered.

Briquets, 42,000 tons annually, are another major by-product. The popularity of this all-heat no-ash solid fuel is shown by the consistent volume of sales throughout the Pacific Northwest. Lampblack is compressed into conveniently shaped and sized briquets, which are delivered to homes and industrial plants in sacks.

The gas manufacturing capacity will be increased by 6,000,000 cu. ft. a day. Steady growth of the use of gas in Portland, Vancouver and Willamette valley areas has made it necessary to increase the generating capacity of the plant. With the new addition, the daily capacity will be upped from 29,000,000 cu. ft. to 35,000,000 cu. ft.

Feature of the new plant will be the battery of four Knowles coke ovens, said to be the first of their kind to be installed west of St. Louis. Low gravity residue of the same type as that used in present operations is "cracked" at high temperatures to form rich gas, tars, petroleum coke. From the gas is

recovered benzol, toluol, xylol and the solvent naphthas.

Wasting no time, the gas company completed contract negotiations in a week after the construction plans were announced. H. A. Brassert & Co., New York, was awarded the contract for the Knowles coke ovens and Bechtel-McCone-Parsons Corp., Los Angeles, Calif., was given the contract for the oil refinery equipment. Both firms are well-known in their respective fields of coking equipment and refinery installations. E. L. Hall, vice president and chief engineer, directed the gas company's pioneering work in developing methods of recovering valuable by-products and the research in two pilot plants (miniature gas works) is which the new methods for this plant were proved. He has won national renown for his outstanding work in by-product recovery and plant efficiency in the manufactured gas industry.

Other major contributors to the success of the project are Norman H. Wardale, superintendent of the company's gas plant, and Hilmar Papst, who joined the company in 1906. Both are veterans in the gas industry and have contributed much to the famed efficiency of Portland Gas and Coke Co.

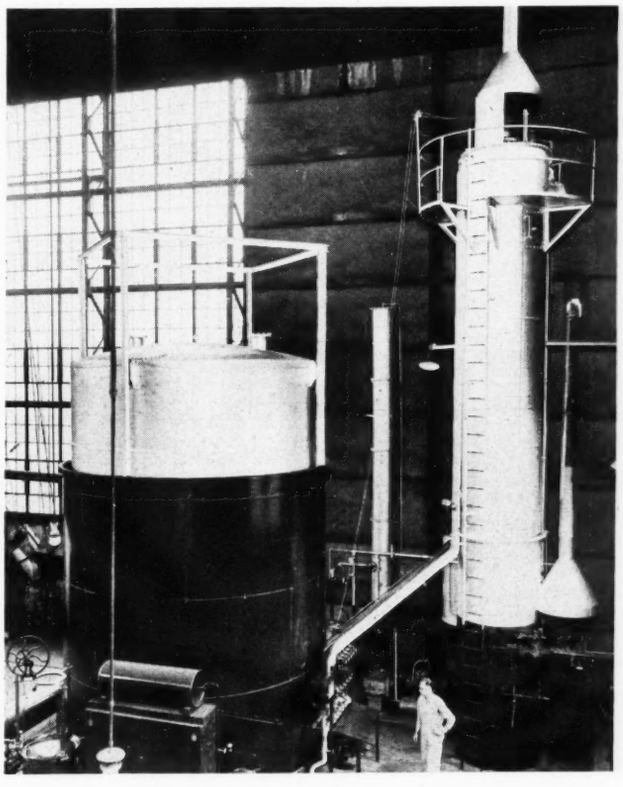
One of the main factors in making the project possible was the investment of $600,000 in new capital by American Power & Light Co., holders of the common stock interest in the company since 1910. The agreement to make the new investment in the gas company was made after successful completion of the 10-year extension of the company's mortgage bonds. "The constructive attitude of this strong holding company and the willingness of its leaders to back up our confidence in the feasibility of the proposed development are largely responsible for this new industry," said Paul B. McKee, president of the gas company.

Built by Oregon men, Portland Gas & Coke Co., is Oregon's oldest industrial firm. With coal brought from Australia in sailing ships in the early 1860's the gas company first produced gas for street lighting which made Portland distinguished among the growing members of the West—the second community in all the western country to enjoy gas service. Since the days of iron men and wooden ships, the company has scored an impressive list of "firsts." It was a leader of the manufactured gas industry in chemical research; it was high in efficiency of its operations in making gas and chemicals; early in use of heavy oil residue from oil refineries in making gas—thereby making possible lower gas rates; a pioneer in developing new methods for recovery of valuable products and chemicals as by-products in making gas; and instrumental in many fields of making gas more useful in home and industry.

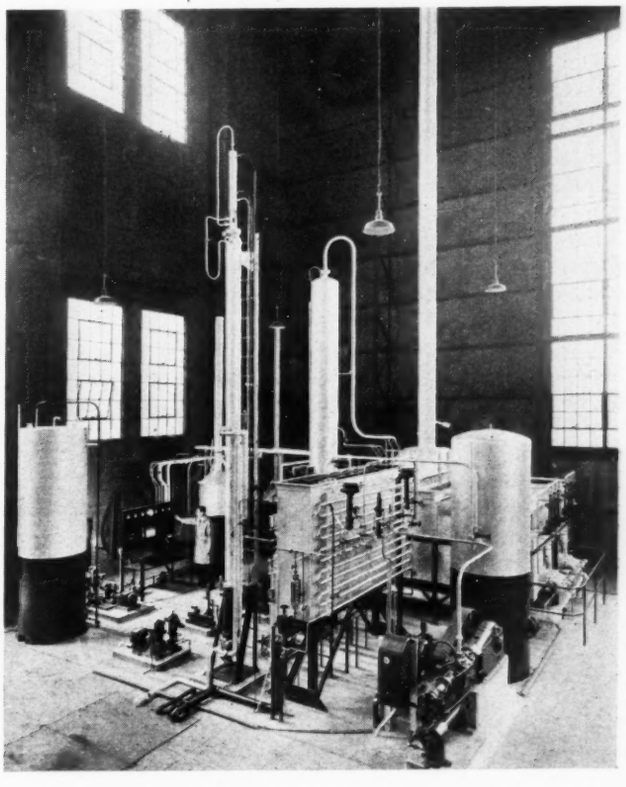
PAUL B. McKEE

E. L. HALL

N. H. WARDALE



This was the first pilot plant built by Portland Gas & Coke Co. to study new methods of making gas and recovering valuable chemicals as by-products. After serving for two years of research, pilot plant No. 2 was built to test and prove the new methods.



The latest pilot plant in which intensive research by the company's chemists and engineers was conducted for two years before plans were completed for its new $1,500,000 addition. This is the second pilot plant built by the company in its seven years of research.

Summer Air Conditioning

3. Operating Data on Equipment Produced by Pittsburgh Lectrodryer Corporation

By G. L. SIMPSON

Vice President and General Manager, Pittsburgh Lectrodryer Corp., Pittsburgh, Pa.

THIS ARTICLE by Mr. Simpson, is the third in a series on gas-fired, summer air conditioning, its equipment and potential market. The first article in this series was published in the February issue of GAS, and was authored by H. W. Heisterkamp, manager, air conditioning sales, The Bryant Heater Co., of Cleveland, Ohio. The second article, published in the April issue, was contributed by G. F. Zellhoefer of the Williams Oil-O-Matic Heating Corp., Bloomington, Ill. The series will be continued in the June issue.—Editor.

MOST people concerned with industrial dehumidification or process air conditioning are now aware of certain advantages obtainable by direct removal of moisture by adsorption. The wide use of the Lectrodryer-Activated Alumina system in processing applications has provided a background of experience and permitted careful development of dehumidification machines. As a result, more careful appraisal of conditions which permit economical operation can now be made. Moreover, these improvements in performance and knowledge are permitting adsorbent dehumidification to expand into comfort air conditioning applications where heretofore the cost of independent control of humidity and temperature has been considered prohibitive.

In any dehumidification system, whether it be by solid adsorption or liquid absorption, there are two important items to be considered. The first is the sorbent itself, and the second is the equipment in which it is employed. Both contribute to the performance, i. e., the cost of removing a unit quantity of water or of obtaining a unit of refrigeration effect.

The Lectrodryer system employs Activated Alumina as the adsorbent for removing moisture. Activated Alumina is a granular, porous, aluminum oxide of high purity. It is available in varying mesh sizes, thus several sizes are used to advantage in different units, especially where resistance to the flow of air is of importance. Activated Alumina is hard and resists crushing even when supported in beds of very considerable depth. An important property is its resistance to degradation caused by the repeated cycles of heating and cooling through which the adsorbent must pass. This stability prevents an increase in resistance to the flow of air after continued use.

The most important property of an adsorbent is its ability to remove moisture at high efficiency under the particular conditions of operation which are best suited for the problem at hand. High efficiency, of course, relates to the quantity of water removed per unit volume of air passed before regeneration is required. The percentage of moisture adsorbed is dependent to a large extent upon the relative humidity of the air to be dehumidified. In no practical equipment is an adsorbent or absorbent capable of attaining saturation at the relative humidity of the entering air. Moreover, the total capacity of an adsorbent or absorbent to remove moisture from a substantially saturated atmosphere bears no relation to the percentage of moisture actually adsorbed when air is passed through a practical unit. In dehumidification equipment where high flow rates and shallow adsorbent beds are employed, the percentage of moisture adsorbed in a given period from air of low relative humidities is more nearly relevant to the practical performance in dehumidification equipment. More specifically, the rate of moisture removal from air of low relative humidity is the important item. The following tabulation shows the percentage of moisture adsorbed by a shallow bed of Activated Alumina when exposed statically for several periods to air at 86° F. and 2 mm. vapor pressure (6.3% relative humidity).

Time Hours	*Activated Alumina Per Cent H_2O Adsorbed*
2	1.00
4	1.75
7	2.20
24	2.75
72	3.50

The above tabulation is presented because the percentage adsorption un-

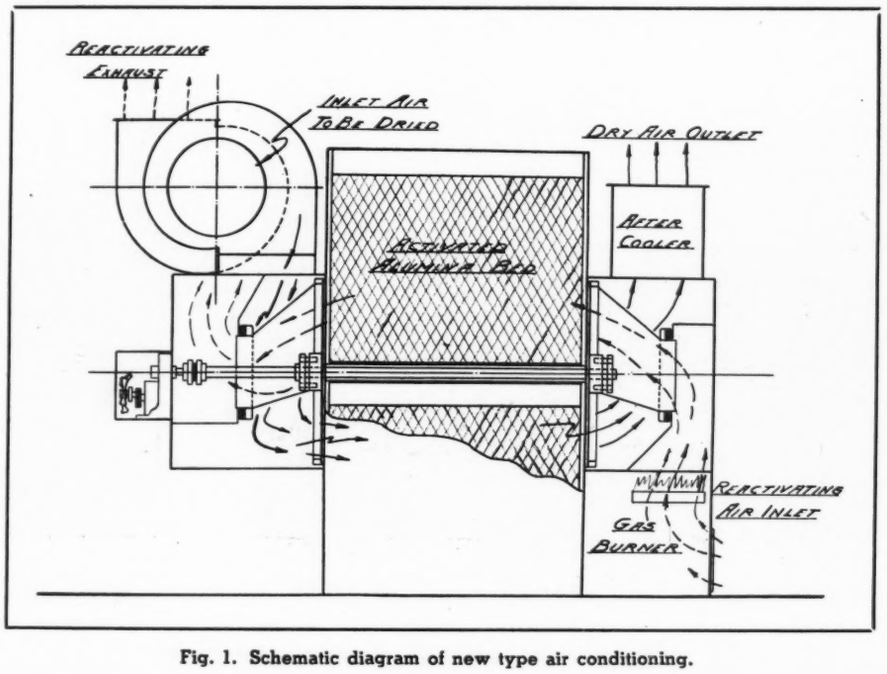


Fig. 1. Schematic diagram of new type air conditioning.

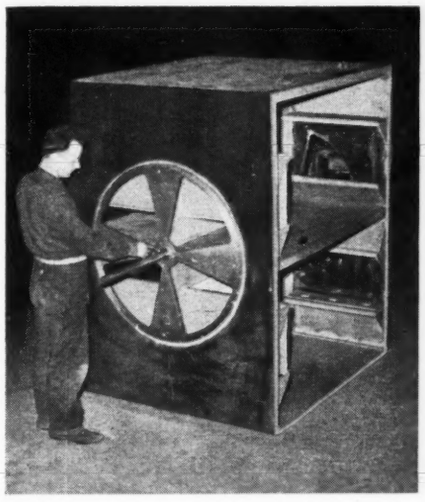


Fig. 2. Showing structural steel framework of the machine.

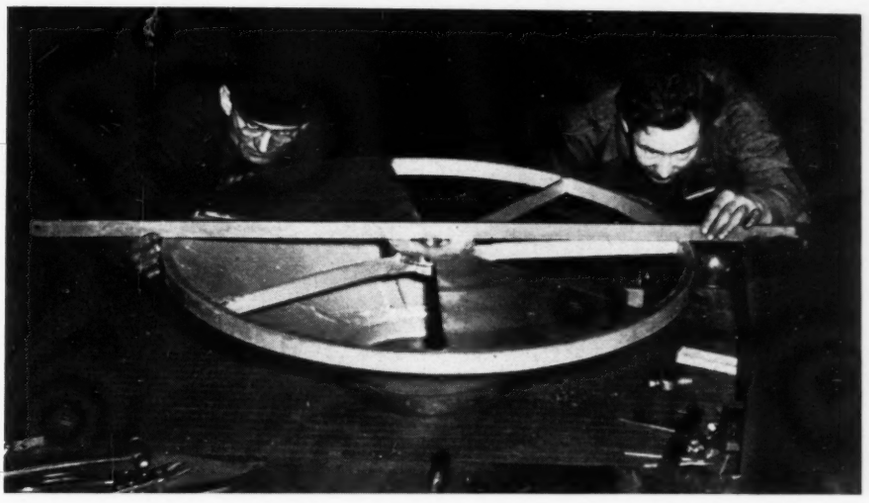


Fig. 3. Checking the machined surface of the rotating members.

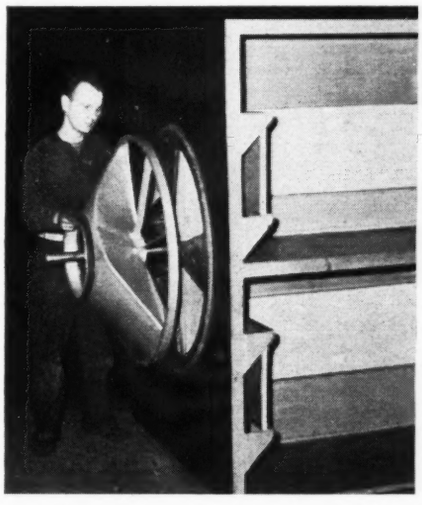


Fig. 4. Valve mechanism assembly.

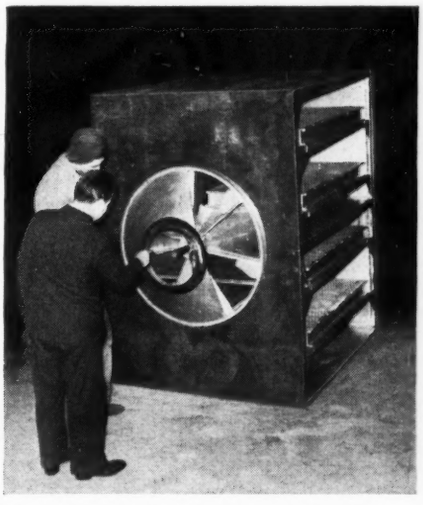


Fig. 5. The valves and beds in place.

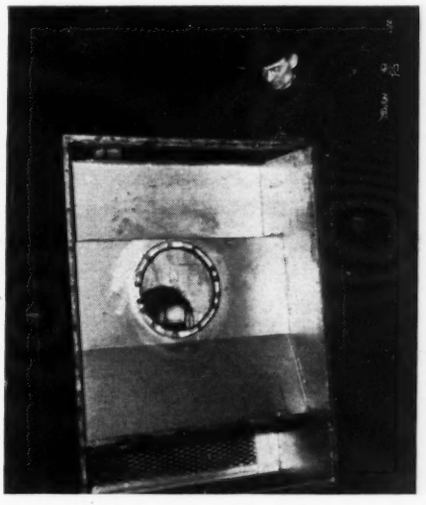


Fig. 6. Plenum chamber.

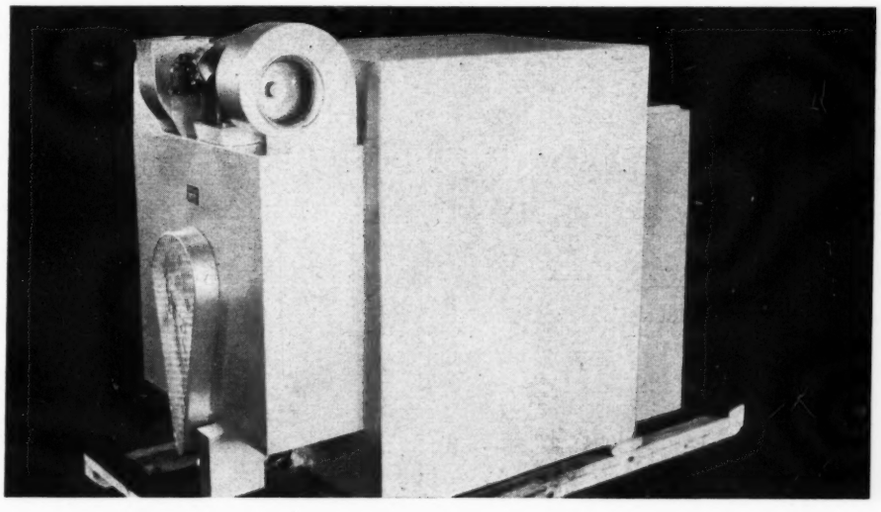


Fig. 7. The completed machine.

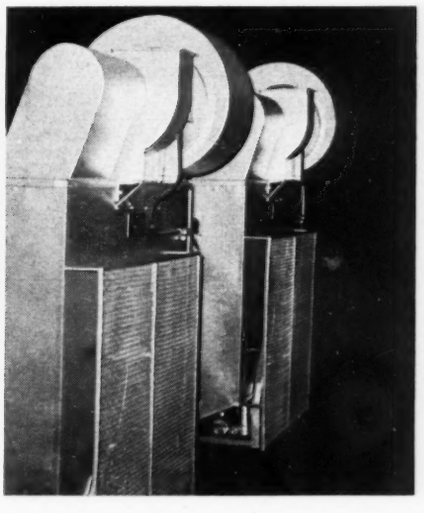


Fig. 8. Two 6000-cu. ft. machines undergoing shop tests for shipment.

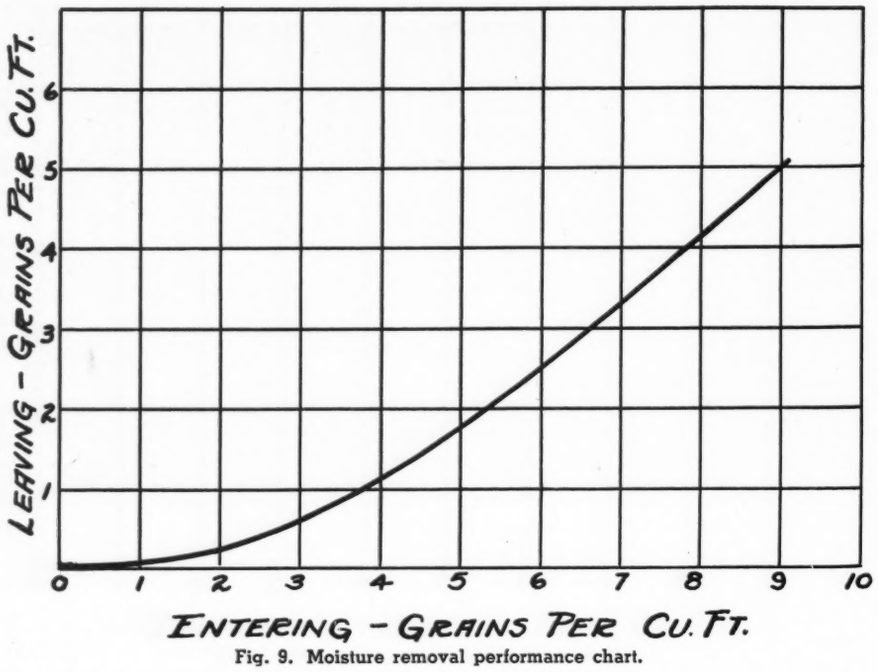


Fig. 9. Moisture removal performance chart.

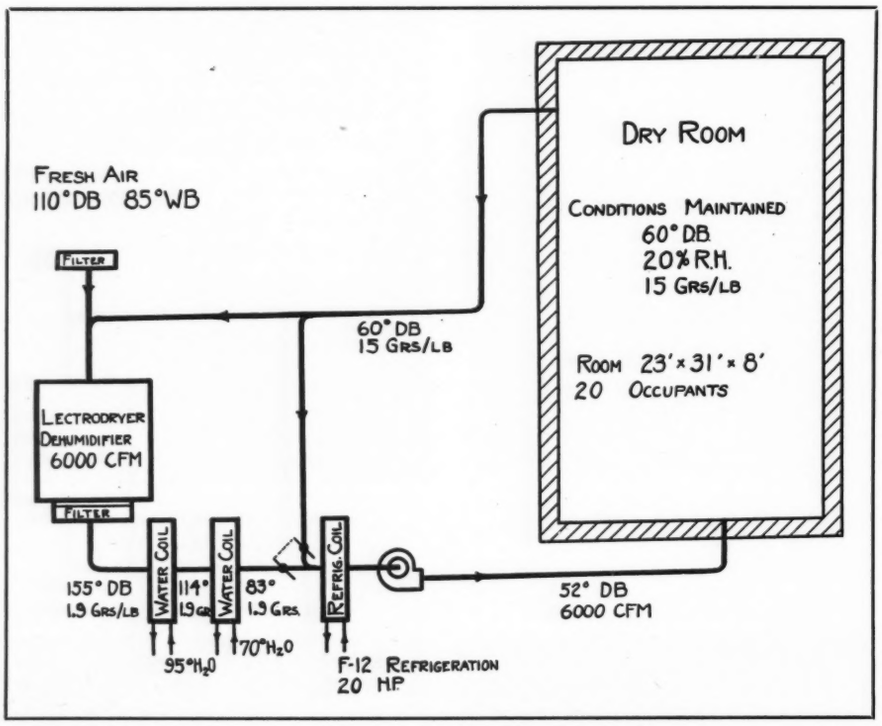


Fig. 10. Engineering data on installation of Lectrodryer for conditioning of rooms with the processing of safety glass.

TABLE No. 1. CH TYPE LECTRODRYER SPECIFICATIONS

	CHG	CHK	CHO	CHR	CHT
Standard air flow, C f. m.	350	900	1,500	3,000	6,000
Overall dimensions—Length in inches	79	84	108	136	153
Width in inches	23	32	52	76	100
Height in inches	48	60	65	96	110
Approximate shipping weight, in lbs.	900	1,600	4,500	7,500	14,000
1000 B.t.u. gas, CFH	40	80	150	280	560
or					
Steam lbs. per hour	45	90	165	300	600
or					
Electric load, KW	10	20	43	80	.....
Cooling water, GPM	3	6	12	24	48
Motor load, HP	½	1	2	5	7½

der these static conditions gives the range of results obtainable in most practical dehumidification equipment. All commercial adsorbents used in shallow beds, or liquid absorbents, take up only 2% to 3% of their weight of moisture before the efficiency of moisture removal drops to a point where reactivation or regeneration becomes necessary. It is apparent, therefore, that insofar as percentage of moisture adsorbed is concerned, the particular adsorbent is not of prime importance. It is the characteristics of weight, rigidity, stability and mesh size together with the particular equipment in which the adsorbent is employed which make a practical dehumidification system.

There are many different types of Lectrodryers for the utilization of Activated Alumina. In this article we confine our attention to the gas fired CH type Lectrodryer for dehumidification of air at atmospheric pressure.

This type of Lectrodryer contains four groups of beds of Activated Alumina. Some of these beds are continually under adsorption while others are continually under reactivation. This provides a continuous stream of dehumidified air.

Two streams of air pass horizontally through the body of the Lectrodryer; one of these streams is directed by a rotating valve through fresh beds of Activated Alumina where water vapor is removed. A similar valve mechanism on the exit end of this stream delivers this dried air to a plenum chamber from whence it passes out of the machine directly to the system duct or an after-cooler. These same rotating valves serve to direct a stream of heated air in the opposite direction through beds of the spent adsorbent to a reactivating fan for discharge from the machine.

How simply this is accomplished can best be understood by reference to the schematic diagram, Fig. 1, and the photographs of the assembly of a CH Lectrodryer which follow:

Fig. 2 shows the structural steel framework of the machine with the four compartments to receive the beds of adsorbent and the machined surface of the ported plate which forms the stationary member of the valve mechanism. A shaft carried on ball bearings extends horizontally through the center of the machine. To this shaft two rotating valves are fastened, one at each end. This construction of these valves is shown in Fig. 3 which pictures the checking of the machined surface of these rotating members. The surface bears against the machined surface of the stationary ported plate shown in Fig. 2 and insures a tight seal between

the wet and dry air streams within the machine.

The relation of these valves to the ports leading into the beds of the Lectrodryer is shown in the assembly of the valve mechanism pictured in Fig. 4.

With the valves and beds in place (Fig. 5) the machine is now ready for attachment to the plenum chambers to each end of the machine to make connection between the rotating valve mechanism and the fans and duct connections of the machine. One of these plenum chambers is pictured in Fig. 6.

Fig. 7 shows the completed machine with the reduction gear and motor of the valve drive mechanism and the fans, in place. The beds are readily accessible by removing the side plates of the machine. The valve mechanism is accessible through inspection plates on the sides of the plenum chambers. The valve-drive mechanism is out where it can be readily inspected and maintained.

In the gas-fired Lectrodryer, reactivation is accomplished by sucking a stream of air through gas burners so that this heated air and the products of combustion are drawn through the beds under reactivation. This gas-burning equipment is housed within one of the plenum chambers taking air from the room through grill work provided. On special applications duct connections are provided to take this reactivating air from the outside. Where gas is not available or its use hazardous on account of fire, steam heating coils may be included with the machine to heat the reactivating air. In this connection the use of isolated small gas-fired steam boilers should not be overlooked as this may provide a market for gas with these machines in such cases.

A fractional horsepower motor through a worm reduction gear drives the valve mechanism which makes one revolution in 20 minutes. The valve drive mechanism is mounted independently of the main fan motor. This provision permits separate and special mounting of the main and reactivating fans and drive to meet unusual needs in certain installations.

Fig. 8 shows two 6000 cu. ft. machines undergoing shop tests for shipment.

The moisture removal performance of this type of Lectrodryer is shown in Fig. 9. If greater dryness than this is desired, an over-sized machine is used and a portion of dried air is recirculated back through the machine. There are Lectrodryers in operation giving dewpoints as low as —50° F. by this method.

There are five standardized sizes of the CH Lectrodryer. Table No. 1 gives a tabulation of these sizes and their characteristics. Larger machines in single units up to 15,000 cu. ft. per minute are built on special order.

In the design of the CH type Lectrodryer special emphasis has been made on the production of a simple mechanism to accomplish the efficient use of the adsorbent, to preserve the adsorbent from mechanical abrasion, and to provide against the increase, through wear, of internal leakage which would derate the machine.

The normal output from a machine of this type is warm, dry air. The heat of adsorption plus a portion of the heat retained in the beds from previous reactivation is carried from the machine in the dried air stream. In some applications of the CH type, the heat in this air can be used to advantage in the process. A case in point is the application of these machines to the drying of pharmaceutical and biological products. Where, however, it is desirable to remove this heat, an after-cooler is provided attached to and supported by the Lectrodryer.

The use of direct dehumidifiers in Industrial and Comfort air conditioning has been well described with diagrams in the first article of this series. (*Gas*, March, 1941, p. 19.) Fig. 10 gives the engineering data on one particular installation of Lectrodryer for the conditioning of rooms for the processing of safety glass. A number of these installations are now in operation and this information is given to aid engineers in solving like problems.

The importance of dried air in industry is constantly increasing. New uses are being discovered as the days go by. Recently, for instance, this equipment has been applied in processing and transporting of materials in powder metallurgy; to prevent the electrostatic leakage in high voltage apparatus and as a source of water-free air where the air is to be used in chemical processes.

Engineers will do well to investigate direct dehumidifiers when they are concerned with drier than atmospheric air.

(This is the third in a series of articles on summer air conditioning. The fourth article is scheduled for publication in the June issue.)

Polarization in Soil-Corrosion Cells

RATES of corrosion* of steel, and probably of other metals, in soils are indicated by the relation between current and electrode potentials in corrosion cells in which current flows without applied emf; in fact, the current required to polarize the electrode of a soil-corrosion cell to the same potential in the absence of *IR* drop has been taken as a measure of the corrosiveness of soils. Apart from its value in measuring corrosion rate, the relation between current and electrode potentials is a useful means for investigating the mechanism of the corrosion reaction, particularly in determining the electrode at which the corrosion rate is chiefly controlled.

The potentials of electrodes in solutions are commonly measured by the direct method, the potentials of the anode and cathode being measured with respect to a reference electrode while the current is flowing. Chiefly because of the high resistance of soils and the nature of the electrolyte and electrodes, this method is not applicable to measurements in soil-erosion cells. Furthermore, as the rate of depolarization of electrodes in soil cells is often very rapid, methods which depend on mechanical interruption of the current are also inapplicable.

Recently, Hickling has described a method for measuring potentials by means of an electronic interrupter and an electronic potentiometer with which potentials can be measured a very short time after the current has been interrupted. This method has been adapted to the measurement of potentials in soil-corrosion cells by Robert B. Darnielle, and a description will be published in the National Bureau of Standards *Journal of Research* for October (RP1336). The accuracy of potential measurements made by this method was found to be practically independent of current and resistance within the cell, *IR* drops greater than 20 volts having been interrupted without affecting the accuracy of the method more than 0.01 volt. The period between the interruption of the current and measurement of the potential was less than 10^{-4} second.

Measurements made by the Hickling method of the potential between the anode and cathode of a variety of soil-corrosion cells were compared with similar measurements made by two alternate methods, to determine the effect of resistance, current, and rate of depolarization of the cell on the accuracy of the method.

*Reprinted from the October, 1940, issue of the *Technical News Bulletin*, published by the National Bureau of Standards, U. S. Department of Commerce.

A. G. A. Laboratories Plan Research

RESEARCH has been a principal part of the activities of the American Gas Association Testing Laboratories ever since their establishment in 1925. A large volume of timely, important and useful investigations has been conducted on domestic gas appliances, industrial application, gas production, utilization, and distribution. Data obtained and conclusions reached have been of great value to the industry. Current investigations now being conducted at the Laboratories supplement previous studies on domestic gas ranges, water heating, burner design, and special industrial furnace atmospheres, all of which were summarized and published in bulletin form last year. In addition, this program has been extended to cover other types of equipment. As such it constitutes the most comprehensive research program in their history.

Working on a complete departure from conventional type gas range top burners, satisfactory progress has been made on burner designs which inject all the air required for complete combustion. Need for secondary aeration may thereby be eliminated permitting a vessel to rest practically on the burner, as well as increasing thermal efficiency. Another gas range study concerns automatic lighting for top burners. Fundamental data thereon reveal possibilities of considerable future improvement by closer control in design of such accessories.

On water heaters a large amount of new data had been obtained on stratification of water in storage tanks. Tentative conclusions reached indicate that increased service efficiencies can be obtained by controlling to some degree direction of flow of inlet cold water. Reducing the amount of agitation by this flow, moreover, decreases the likelihood of corrosion of the storage vessel.

Other investigations are now being conducted on design of burners for use on space heaters, central heating appliances, and large water heaters. Two new projects devoted to space heating and central heating equipment have also been started. Relationship between design of heating elements of space heaters and their heat transfer is now being determined. At the same time a broad investigation on sources and causes of noises of central heating appliances is under way.

The most recent project assigned to the Laboratories is an extensive testing program of contemporary summer gas-fired air conditioning equipment. This work will provide an engineering and economic analysis of the present status of gas-fired air conditioning appliances, as well as recommendations for their further improvement.

To conduct this extensive program the Laboratories' Research Staff, now totaling 16, is the largest in its history. With the exception of the librarian, all are graduate engineers. Two are Doctors of Philosophy, one holds a Mechanical Engineering degree, and two have Master of Science degrees in Chemical Engineering. Moreover, a majority of the members of the staff have taken and are continuing to take advanced courses in study in local universities. Their long academic preparation, combined with basic training in industry, makes them well qualified to conduct these investigations.

Heading this group is R. M. Conner, director of the Laboratories since their inception. His achievements as manager of the appliance testing laboratory of the Portland Gas and Coke Co., Portland, Ore., are well known. His wide experience in all phases of the industry extends over 26 years. In 1924 he received the Gold Medal Award of the Pacfic Coast Gas Association for his services as chairman of the committee which prepared the well-known pioneering Gas Appliance Testing Code. In 1939, in recognition of his "exemplary services in conducting appliance research," he was made the first recipient of the Award of the Guild of Ancient Supplers.

Dr. F. E. Vandaveer, assistant director in charge of research, has also been with the Laboratories since 1925. He was previously associated with the Peoples Gas and Coke Co., of Chicago. He obtained his degree of Doctor of Philosophy in Industrial Chemistry at the University of Illinois, where he also received a Fellowship from the Illinois Gas Association. During these years of service to the gas business, he has become recognized as an outstanding authority on gas analysis. Assisting Dr. Vandaveer in administering the broad scope of activities are F. O. Suffron, in charge of domestic and industrial research, and W. B. Kirk, in charge of requirements research and air conditioning. Mr. Suffron had nearly 15 years experience in the gas business before coming to the Laboratories 11 years ago. Mr. Kirk has been engaged in various capacities for the last 11 years, four of which have been in requirements research at the Laboratories.

The members of the research staff of the Testing Laboratories of the American Gas Association. The two men seated in the center of the first row are R. M. Conner, for sixteen years director of the Laboratories, and F. E. Vandaveer, assistant director, who also has spent sixteen years in A.G.A. research.

Minneapolis Industries To Use Natural Gas

Contracts to supply three larger Minneapolis, Minn., firms with some 1,552,000,000 cu. ft. of natural gas a year were disclosed recently with the filing of contracts between the Minneapolis Gas Light Co. and two of the industries.

The Minneapolis Brewing Co. and Fleischmann Malting Co. contracted to use natural gas from May 15, 1941, to June 30, 1945. In addition, natural gas was to have been piped to the Minneapolis Street Railway Co. power plant shortly after April 15.

THIS NATURAL GAS INDUSTRY

By BURT R. BAY

President, Northern Natural Gas Company, Omaha, Nebraska

The Gas Field—Dotting America's plains and hills are thousands of gas wells—there begins the story of natural gas.

IF we think of our form of enterprise in terms of years, the operations incident to the production, transmission, distribution and sale of natural gas still constitute a youthful industry. In such respect its background compares with the oil and electric industries, since all three had their material beginning in the latter part of the 19th century and taken collectively, their discovery, development and use probably contributed more to the advancement of science and the art of good living than any other similar epoch, marking the progress of man.

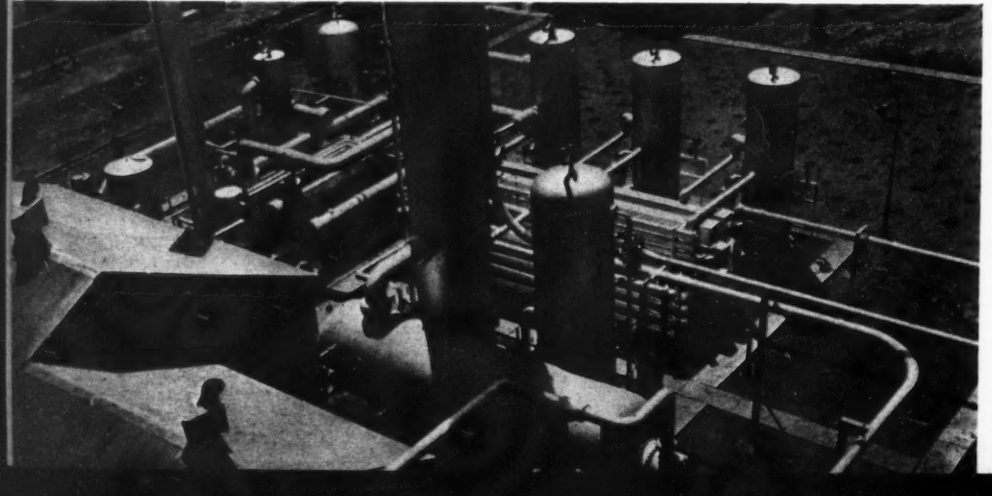
Natural gas, oil and electricity are all a form of heat energy and therefore competitive marketwise, in the true sense of the word, although each seems to have particular applications where it excels, and overlapping a common usage as a rule is just sufficient to result in a type of competitive effort which may be classified as constructive or helpful to all as there is ample evidence of the forward march of each industry in communities and whole areas of greatest marketing activity.

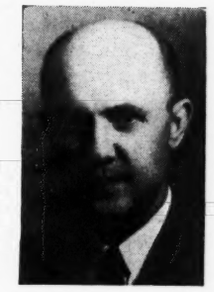
What I am trying to make clear is that healthy forms of competition bring out the best in us and by applying our ingenuity to study, research, and development, we can progress to ends hitherto undreamed of. In the case of these three parallels, the public, as it rightfully should be, is the beneficiary through opportunities afforded for broadened and new usage, improved service and generally lowered costs.

Historical Background: Looking back in the pages of our history to the turn of the century, we find the natural gas industry a youngster in swaddling clothes. Although gas was then known to be present underground in some 15 or 16 states, the principal producing and marketing areas were in northwestern New York, western Pennsylvania, portions of West Virginia, Ohio and Indiana. The latter was slowly disappearing from the natural gas producing picture and the vast mid-continent area was barely beginning to come into its own. Monroe and Richland in Louisiana were city and parish, respectively, and not listed as names among the largest of gas fields. Cushing, Burbank, Chickasha and Seminole were just towns in Oklahoma (then Indian Territory), and Hugoton was scarcely a wide place in the road in southwestern Kansas where hardy pioneers were finding out that a few inches of rainfall, fairly distributed through the growing season would bring forth a good wheat crop from the fertile land thereabouts. The wealth and reputation of the Texas Panhandle came principally from cattle raising and we had scarcely heard of Kettleman Hills, Hobbs, or any of the hundreds of areas in the 25 states where natural gas is now produced and distributed in commercial quantities.

Although natural gas had been used in a limited way in this country for some 30 years before the drilling of the Drake well in 1859, the growth of this usage was slow, and by the end of the century the volume of sales was still comparatively small. For example, U. S. Bureau of Mines statistics show the value of natural gas consumed by domestic, commercial and industrial

Gas Processing—A diethylene glycol dehydration unit—at such plants natural gas is stripped and prepared for its journey through the pipe line.





BURT R. BAY

BURT R. BAY, as president of the Northern Natural Gas Co. of Omaha, Neb., is the head of one of America's largest natural gas transmission systems. The Northern Natural Gas Co., which during the year 1940 made extensive additions to its facilities, carries gas from the fields of Texas, Oklahoma and Kansas to numerous communities in the states of Kansas, Nebraska, Iowa and Minnesota. This article was presented as a paper, "The Natural Gas Industry — Some Comments on Its Past, Present and Possible Future Trends," before the 36th Annual Convention of the Mid-West Gas Association, which met in Minneapolis, Minn., April 14 to 16, 1941.—Editor.

users, during the entire 10-year period ended in 1901, to have been $169,148,000, or roughly an annual revenue of $17,000,000. Contrast that total with the annual revenue, from the sale of natural gas, of almost $500,000,000 for 1940, and one can better visualize what has taken place in our industry during the last 40 years.

Natural Gas Production: Since we deal with a wasting mineral resource, we may ask how this growth came about. The first part of the answer lies in the discovery and development of vast underground stores of natural gas in widely spread fields throughout our country, and it is proper to acknowledge that much of the credit for these discoveries of natural gas producing areas may be given to men in the oil industry for their willingness to risk capital in the drilling of wells in new areas and in the exploration of deeper formations in known producing fields. A substantial portion of present known natural gas reserves is directly traceable to this search for oil.

The Geologist and Engineer have contributed much to this expansion of the natural gas industry during the last four decades. To illustrate this fact, let us draw a few comparisons and point to some of the progress of recent years:

The science of geology has been employed in locating oil and gas deposits and in field development. In recent years, advanced geophysical methods have supplanted the earlier practice of surface structure study, in locating probable new producing areas.

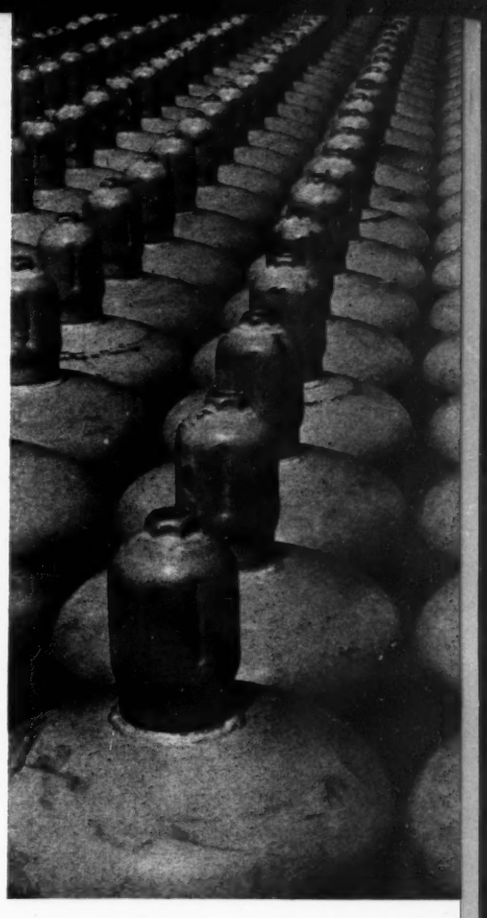
Careful study of subsurface geology has contributed much to the development of proven areas and to the conservation of our mineral resources through greater recovery from wells properly completed.

The rule of capture, long applying to the production of both oil and gas, appears to be slowly giving away to recognition of the ownership of minerals in place. In this connection it is not unusual to see many interests in a common source of supply, join together in a unit plan of development and operation.

Wider spacing of wells is receiving more attention, and the old tendency to drill two or more wells where one would suffice is gradually being overcome in favor of a more economical and orderly plan of development.

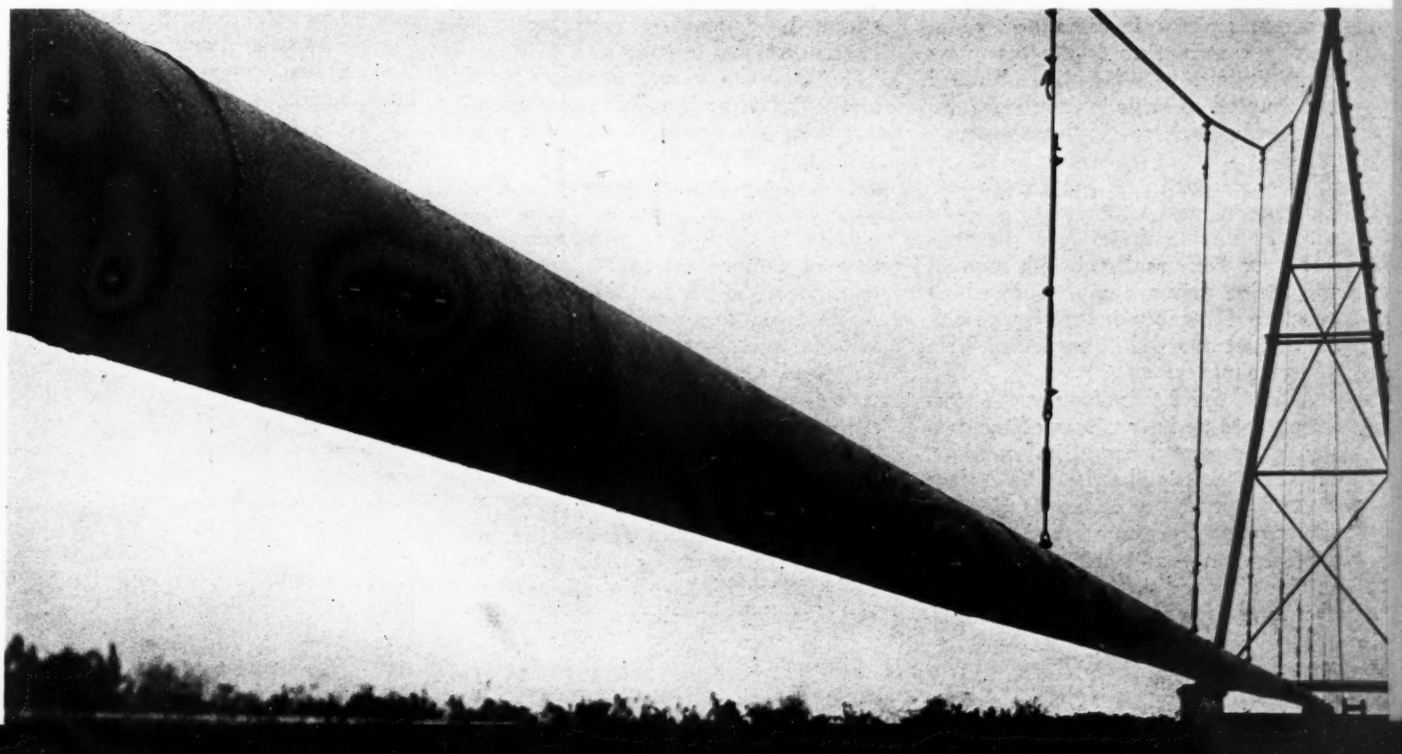
To a great extent cable tool drilling has been replaced by rotary drilling methods thereby effecting economies in the use of well casing and in many areas permitting the exploration of deeper horizons.

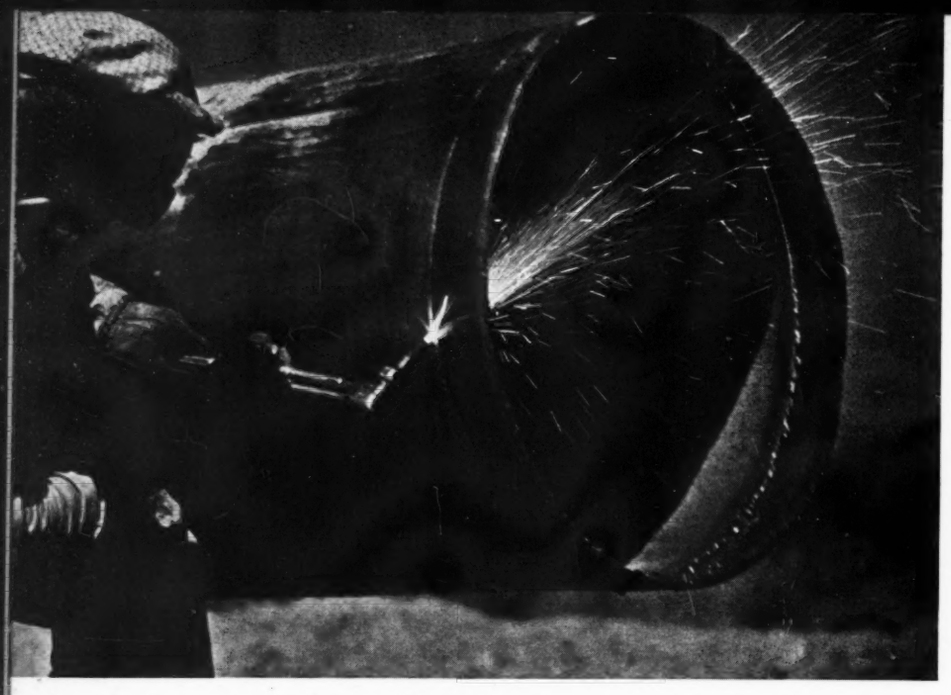
Where production is found in a lime foundation, the use of a weak hydrochloric acid solution, to increase the potential of a producing well, has been found to be effective. This has re-



Allied Industries—Like soldiers at attention stand bottles of LP-Gas.

The Pipe Line— Cross country, over hill and stream go the pipe lines bringing natural gas to distant cities.





The Worker—His creative skill and loyalty, in the field and office, have played an important role in building the natural gas industry of today.

placed, to a considerable extent, the early practice of shooting wells with nitro-glycerine.

Natural Gas Transmission: The last 15 years have witnessed the transition of our business from one local in character to one almost national in scope.

We have seen the passing of lapweld and hammerweld pipe in favor of electrically welded and seamless pipe for use in natural gas transmission lines. Pipe of more uniform quality, greater strength and longer lengths is now available to our industry. These factors bring about a reduction in the number of field joints necessary in construction and permit the design of pipe lines for higher operating pressures.

To a considerable extent hand labor in pipe line construction has given way to the use of mechanical means for ditching, laying and backfilling, with resultant savings in time and costs, thereby contributing to the economic feasibility of longer pipe lines. Welded and coupled construction methods have practically rendered obsolete the use of threaded joints in pipe lines, and large volume measurement has progressed, resulting in greater accuracy.

Steam engine driven gas compressors have been replaced with modern gas engine driven compressors which compare favorably in efficiency with the highest attained in any other form of prime mover.

Natural Gas Utilization: In the marketing field we have witnessed the constantly broadened use of our product. While gas lighting has been lost to our electric friends, we witness today the use of natural gas on a broad scale for refrigeration — a growing opportunity in the air conditioning field, and an ever-increasing use for domestic cooking, water heating and househeating.

Industrial applications have expanded in the manufacture of steel products, face brick, refractory materials, and other forms of ceramics. This also is true in glass melting, the burning of cement clinker and lime, and the reduction of metals other than steel. In addition many varied uses have been found for the manufacture of chemicals and synthetic materials from the hydrocarbons contained in natural gas.

Value to Related Industries: Clearly aside from the production and transmission of natural gas for consumption as a fuel, other related industries, dependent upon natural gas for their existence, were conceived and have had a remarkable growth in this same period. Included in these are the manufacture or production of natural gasoline, carbon black, liquefied butane and propane, commonly referred to as bottled gas, and distillate.

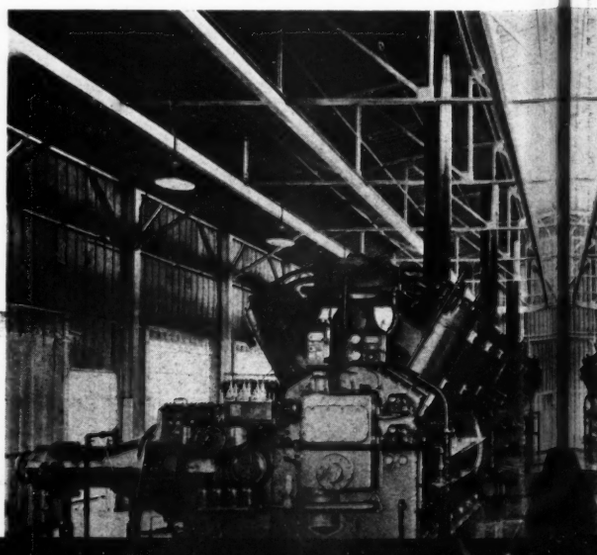
1. Natural Gasoline: The recovery of natural gasoline is an important operation directly associated with the production and transmission of natural gas. This product, composed of higher hydrocarbons of the series, is used principally for blending in the manufacture of motor fuel to which it contributes a higher anti-knock rating. Aside from the profit angle of the manufacture of natural gasoline, which has been comparatively small during recent years because of low prevailing prices, its removal is a definite aid to the operation of gas transmission lines as some of it, if left in the gas would condense, especially during winter periods, and as a liquid obstruct the normal flow of the dry gas. Stated differently, it would have the effect of restricting line capacity.

The various processes devised for its removal, all of which have come about on a commercial scale in the last 30 years, include oil absorption, charcoal absorption, and compression. The first named process is now in general use. It embraces contact of the natural gas at high pressure with a straw oil, in an absorber where the flow of the gas is counter to that of the liquid. The oil discharged from the absorber is passed through a heat interchanger into a distillation unit from which the gasoline vapors pass through a fractionating column where several products, including natural gasoline of varying vapor pressures, butane, and propane are separated and thereafter condensed and collected in storage tanks. The denuded absorption oil passes from the still through the heat interchanger and cooling equipment back to the absorption tower, thus completing the cycle.

Most of the early absorption gasoline plants built in connection with natural gas pipe lines were constructed between 1915 and 1920. With this short background of history, the industry had a steady growth, reaching its peak in 1929 when the production of natural gasoline from both dry gas and casinghead gas amounted to 2,233,000,000 gals. The annual rate of production for the last three or four years has approximated 2,000,000,000 gals. About 80% of this quantity is used at refineries for blending with motor fuel and of the remainder, about 50% is exported in a normal year.

2. Carbon Black: Prior to the year 1920, the world consumption of carbon black was relatively small and its uses were confined principally to those incident to the manufacture of ink and paint. Since the year referred to, the rubber industry has become the largest user of carbon black, which goes principally into the manufacture of tires. Carbon black combined with rubber has the effect of giving greater life and

The Compressor Plant—stationed along the pi lin

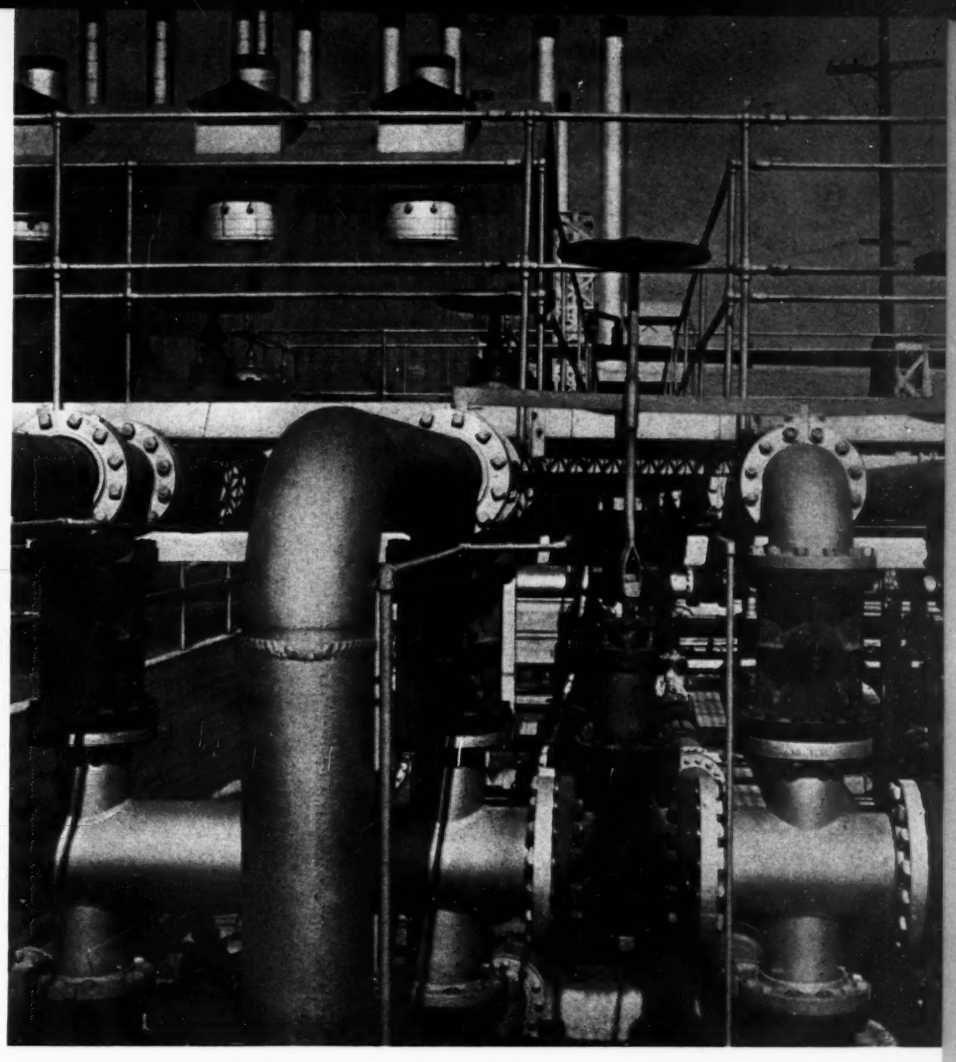


resistance to wear to the automobile tire, possibly three-fold or more in instances compared to the expected life prior to its use. The production of black from natural gas for the most part is confined to the State of Texas where approximately 450,000,000 lbs. annually have been manufactured in recent years, out of a total of about 525,000,000 lbs. per year for the entire United States.

There are two distinctly different processes used in its manufacture. One, sometimes called the Chemical Black process, obtains a yield of 9 to 11 lbs. of black per M c.f. of gas, whereas the other commonly referred to as the Channel Black process, only yields about 1.4 lbs. It is claimed that Channel Black is of the highest quality and therefore most suitable in tire manufacture, yet to the gas man it seems to be a wasteful process as the recovery of this type of black only represents about 4% of the carbon content of the gas processed.

Nevertheless, carbon black occupies an important place in our economic life. The size of the industry is indicated by the fact that 347,000,000,000 cu. ft. of natural gas were used in its production in 1939 or about 15% of the marketed production of natural gas in the United States. This quantity of natural gas, annually consumed in the manufacture of carbon black, approaches the total annual volume used in the United States by domestic consumers.

3. Liquefied Petroleum Gases: That branch of the gas industry, sometimes referred to as the Liquefied Petroleum Gas Industry, is in reality the manufacture and sale of either butane or propane or a combination of both in liquid form. Although not constituting the entire supply, these two hydrocarbons are present to a more or less extent in practically all of the so-called dry natural gases and their separation



The Measurement Station—Here the gas is received, rerouted, and dispersed through an intricate network of pipe lines to the ultimate consumer.

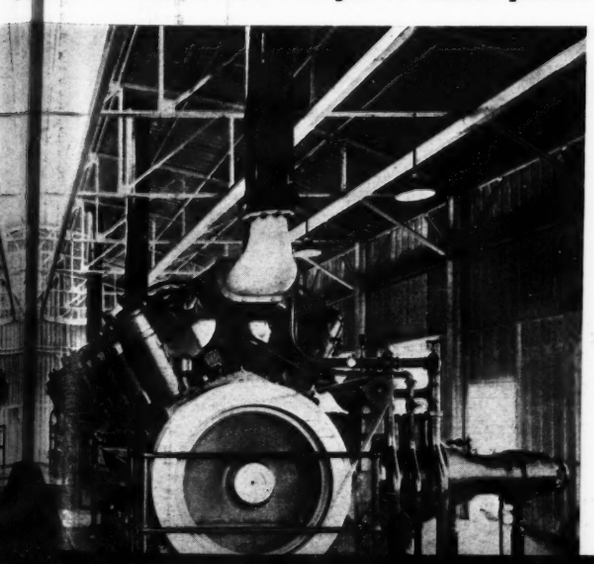
is accomplished through fractionation, a process which follows distillation in the cycle incident to the recovery of natural gasoline. The marketing of butane and propane has made rapid strides during recent years. According to statistics compiled by the Bureau of Mines, total sales of these liquid hydrocarbons in 1922 amounted to 223,000 gals. From another source, we find that in 1940 this total had grown to 300,000,000 gals. A breakdown of 1940 uses shows that 46.3% of the 300,000,000 gals. sold was distributed as bottled gas, 27% was used in industry, and 23.4% in gas manufacturing. A part of the remainder was used in the manufacture of synthetic rubber.

The rapid growth of this branch of industry is indicated by the fact that 1940 bottle gas retail sales increased 46.3% over 1939. Much of this was distributed in rural areas where its uses spread to all of the Four Big Jobs. With regard to supply, it is said that the volume of marketed liquefied gas in 1940 represented less than 10% of the volume of these gases used in the production of gasoline by blending or through polymerization processes.

G. G. Oberfell, in an article appearing in the February, 1941, issue of *Butane-Propane News* (page 11), states that the estimated total of the retail customers of this liquefied gas at the end of 1940 was 1,125,000, a gain of 325,000 during the year. Aside from the domestic uses for this type of fuel, butane and propane serve as fuel for internal combustion engines used on well drilling, railroad locomotives, air conditioning plants, and electric generation. It is also commonly used to meet the peak load demands of gas systems of utility companies.

4. *Gas Condensate Recovery Through Recycling:* Well up in the list of those branches of our industry which tend to conserve our natural resources is another infant prodigy which is rapidly assuming substantial proportions, namely, the recovery of gas condensate by recycling. Little more than two years ago there were 10 plants in operation, processing 106,000,000 cu. ft. of gas per day, and recovering approximately 2235 barrels of liquid gas condensate. By the end of 1940 this operation had grown to 31 plants processing 1,168,000,000 cu. ft. of gas per day from which there was an average daily recovery of 20,118 barrels of condensate.

pipe line boosts the flow of gas to distant points.



The Gas Holder—Stored in this giant of the industry, millions of cublic feet of natural gas await the consumer's instant desire at the turn of a valve.

While the liquid recovered varies in character as between fields, its composition is largely that of natural gasoline and kerosene distillate making it suitable for processing into motor fuels and other products.

It is said that the rapid increase in the rate of condensate production is not keeping pace with the development of new reserves and that there are many fields in the States of Texas, Louisiana, and Arkansas capable of producing gas and liquid condensate which are not yet exploited. Preparation for an installation of this nature where more than one ownership exists, requires unitization of all of the interests in a producing field.

The development embraces the drilling of both producing and injection wells, usually in the ratio of one of the latter to three of producing wells. Since most of the distillate production is found in deep horizons, the operation is usually conducted under extremely high pressures, in instances as much as 4000 lbs. The cycle embraces the delivery of gas from the production wells to a compressor plant where the condensate is recovered by expansion and cooling through reduction of pressure and by the absorption method commonly used in natural gasoline recovery. The residual gas is then compressed and returned to the formation through the injection wells. This process of recovery, properly carried out, has the advantage of practically eliminating gas wastage since the loss in volume of gas treated can be confined to that incident to the slight shrinkage of the total quantity, due to the removal of the liquid hydrocarbons and to the use of gas for plant fuel purposes. In this process vast stores of natural gas are being held underground for future use as light and fuel.

The Inerts in Natural Gas: Aside from its hydrocarbon constituents, natural gas usually contains small amounts of other products, classified by the chemist as inerts. These include nitrogen, helium and carbon dioxide.

1. Helium: To my knowledge no practical use has been made of the nitrogen contained in natural gas, although the recovery of helium has been a rather important operation since the period of the World War No. 1. There are three helium recovery plants in this country, all owned by the Federal Government. One is located near Amarillo, Texas, another at Dexter, Kan., and the third at Thatcher, Colo.

Present production is confined to the Amarillo plant. According to the Minerals Year Book, this plant produced 6,281,800 cu. ft. of helium in 1939 and 3,906,000 cu. ft. in the first half of 1940. The total production of the plant from the date of its completion in 1929 to June 30, 1940, is given as 94,447,000 cu. ft. Gas for this operation is obtained from the Cliffside Gas field, located a short distance from the Panhandle gas field proper. The helium content of the natural gas produced in the main portion of the Texas Panhandle field is understood to be less than 1% by volume. However, the gas from the so-called Cliffside field is said to contain appreciably more.

The uses of helium in addition to those in lighter-than-air craft, have spread to scientific studies and the public health service. The use of helium in the treatment of asthma and respiratory diseases is reported to be the outgrowth of research in the use of helium in diving operations. Under an Act passed in 1937, this product has been made available to the public at its cost of manufacture.

2. *Carbon Dioxide:* As a general rule the natural gas produced from wells in the Texas Panhandle and Hugoton fields contains much less than 1% of carbon dioxide. In contrast with this, underground deposits of gas containing a high percentage of carbon dioxide have been found in the states of California, Colorado, New Mexico, Utah, and Washington, where it is used on a commercial scale in the manufacture of dry ice. Latest available statistics give the annual output of dry ice and liquid or gaseous CO_2 combined, as 206,000 tons valued at about $9,500,000. These data in addition to the natural carbon dioxide, include recovery of CO_2 from lime, cement and other process plant gases. In addition to the manufacture of dry ice for use as a refrigerant, carbon dioxide is employed as a fire extinguisher and beverage carbonator.

Even the lowly hydrogen sulphide which is present to some extent in natural gas in certain producing areas, although objectionable from a pipe line and consumer angle, can be converted into useful chemical products.

Utilization for Chemical Products: This discussion of present-day uses of natural gas, all of which have a direct relationship to our industry, would hardly be complete without mention of

the utilization of natural gas for chemical products, a phase of our business which offers many possibilities and is receiving more and more attention each year. From the Bureau of Mines Information Circular No. 7108, we learn that the use of natural gas as a chemical raw material may be said to have begun in 1918 when alcohols were shown to be present in cracked petroleum distillates. This circular points out that the development and utilization of natural gas for chemical synthesis was slow until recent years when chemists were able to show that natural gas hydrocarbons will react when activated by the effects of heat, pressure, chemical reagents and light. Further as these results were known, the possibility of a synthetic organic chemical industry based upon these reactions became apparent, and today this industry is large and growing rapidly in importance.

Generally speaking natural gas as produced consists principally of methane (CH_4) and ethane (C_2H_6). Aside from these two fractions, the remaining portion is usually composed of propane (C_3H_8), butane (C_4H_{10}) and other heavier or higher molecular weight hydrocarbons plus a varying percentage of inerts, which, as stated previously, include carbon dioxide, nitrogen, and in instances helium. In some areas hydrogen sulphide and sulphur mercaptans are present.

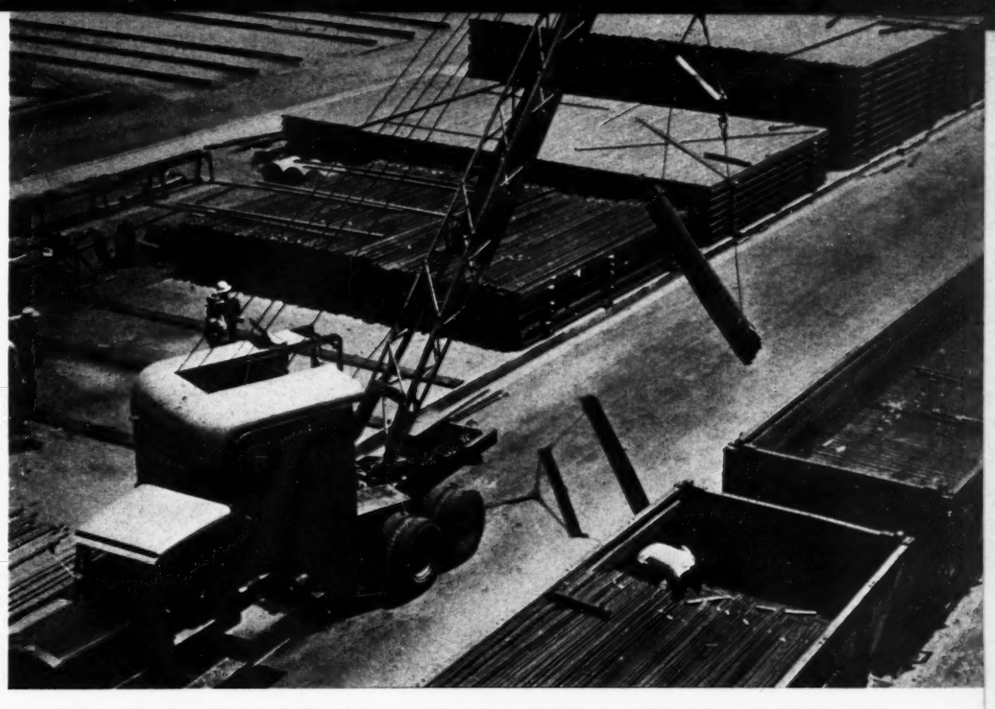
To accomplish the processing of these paraffin hydrocarbons in natural gas, chemists have discovered four principle methods of approach.

1. Decomposition, which splits the hydrocarbon molecule into fragments by heat, either alone or with the aid of a catalyst or by electric discharge.

2. Oxidation, a reaction of the hydrocarbon molecule with oxygen or air activated by heat in the presence of a catalyst.

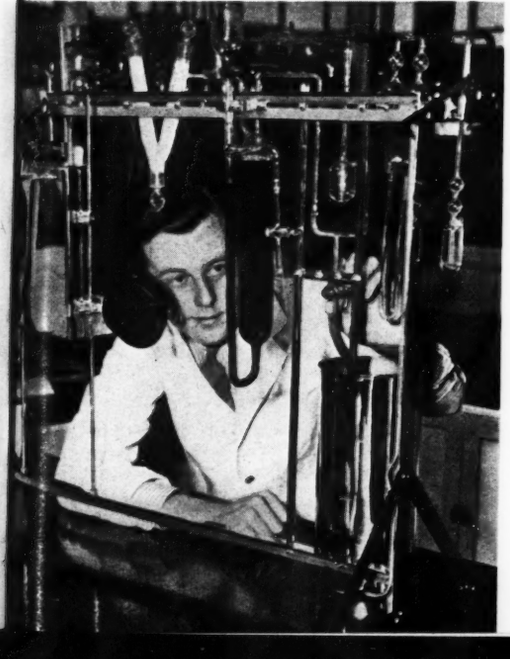
3. Halogenation, a reaction of the hydrocarbon molecule with a halogen, generally chlorine activated by heat, light or catalyst.

4. Nitration, a reaction of the hydrocarbon molecule with nitric acid in the vapor phase, activated by heat.



The Pipe Yard—A derrick swings the pipe from a railway car. Here the equipment is stored; here the construction activities for distribution originate.

The Laboratory—Here the industry plots its course and finds its future.



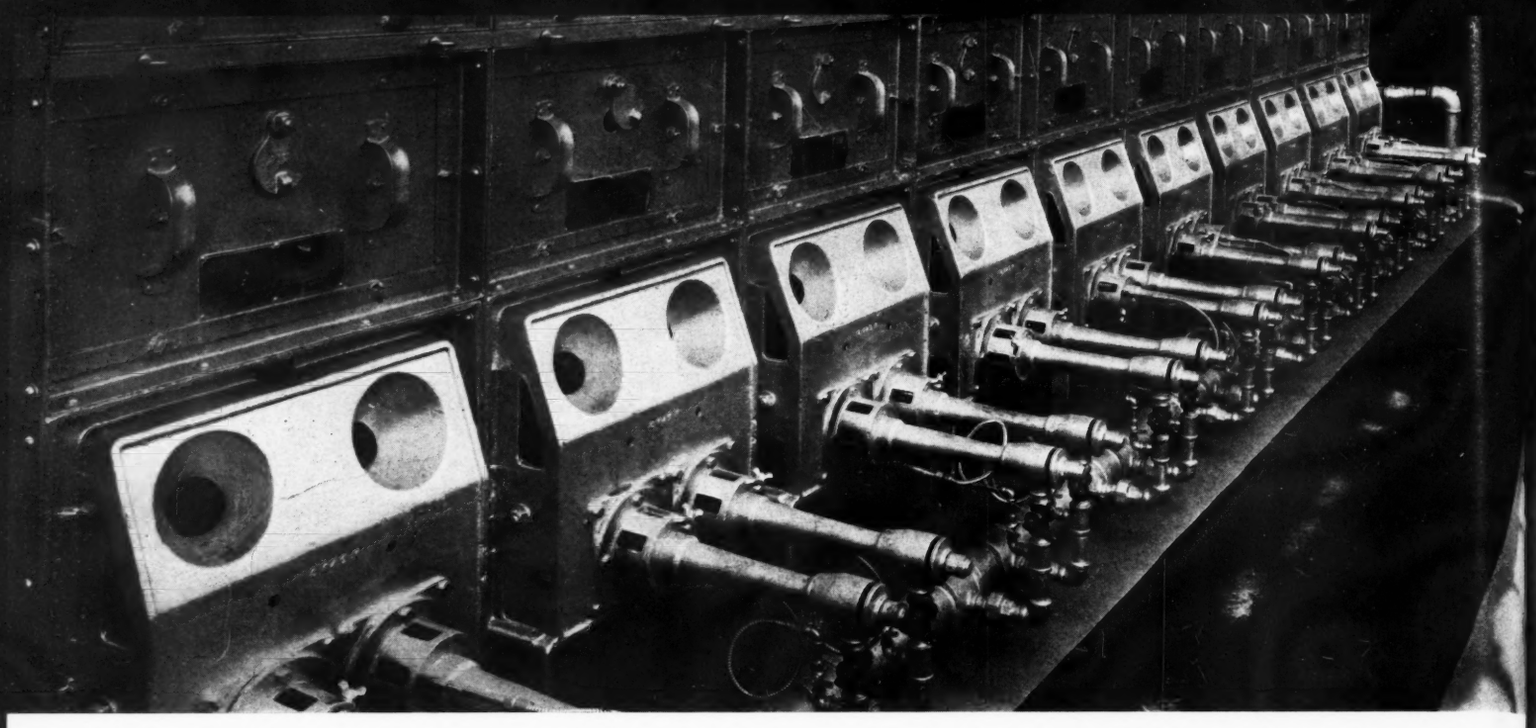
Without attempting a lengthy discussion of the products and their derivatives obtained by these four basic methods of converting paraffin hydrocarbons to chemicals, I might mention that there are literally dozens of organic chemicals in which natural gas or a fraction thereof is used either directly or indirectly as a raw material in the manufacturing processes. Included in these products are several alcohols, which serve as solvents and anti-freeze solutions; formaldehyde, commonly used as a preservative and disinfectant; acetone, a widely used solvent; and several chlorides used as refrigerants and solvents, in anesthesia, and as an anti-knock compound in motor fuel. In addition there are base materials for molded plastics, glycols and amines for dehydration and sulfur removal, and compounds which enter into the manufacture of explosives.

Aside from its chemical attributes, natural gas lends itself to cracking or reforming in the manufacture of gas of a quality or B.t.u. value to meet the particular need. Reformed natural gas for mixing with blue gas is used quite extensively and for such purpose offers the opportunity to reduce the carbon monoxide content of the over-all mixture. Cracked natural gas can be used successfully as a fuel to replace producer gas where the gas burning equipment is designed for low heating value fuels and where natural gas is only available during off-peak periods.

The Record Today: With this mention of some of the many uses of our product, let's turn to the record of the gas industry of today.

From the standpoint of invested capital, the natural gas industry ranks seventh in the United States, and in no other country in the world do we find a like activity even remotely approaching ours in size whether measured by the available supply, invested capital, distance of transmission or number of customers served. At the end of 1940, natural gas companies supplied towns and cities, including those where natural gas is used for enriching or mixing with manufactured gas, with a combined population approximating 45,000,000 people. On this same basis, customers served totalled nearly 10,000,000, the largest number ever connected to the mains of the industry. Of such total 7,763,400 customers were supplied with straight natural gas. Natural gas companies grossed $488,117,000, a gain of 9.5% for the year. The sale of natural gas for domestic uses registered a pronounced upturn, rising from 372,971,000,000 cu. ft. in 1939 to 419,354,000,000 cu. ft. in 1940, a gain of 12.4%. Sales of natural gas for industrial purposes rose from 654,662,000,000 cu. ft. in 1939 to 719,776,000,000 cu. ft., a 1940 increase of 9.9%.

Preliminary estimates indicate that the production of natural gas in 1940, including amounts used in the manufacture of carbon black and for field purposes, reached a total of 2 trillion



The Industrial Consumer—In factories and shops everywhere gas is the fuel that is building a better America.

600 billion cu. ft. Industry and business used about 55% more gas during 1940 than during the boom of 1929.

The Future: With this splendid record of continued growth of natural gas usage in the fuel field and the constantly expanding use of natural gas in new fields, there is good reason to believe the door is open to further progress. There is certainly no present evidence that would lead us to believe our product will be thrown on the scrap pile of a changed economic order through replacement by a more flexible or finer fuel.

On the opposite side of the ledger we must recognize the uncertainty of the immediate future and that all industry faces new and unusual problems. Try as we may, we cannot treat lightly the situation presently confronting us. Costs of many of the materials we use in our plants and properties are on the upgrade, labor rates continue an upward trend and the greatest burden of taxes we have ever known is in the offing. While in many lines of endeavor it may be simple procedure to offset these trends by corresponding increases in the price of commodities or manufactured articles, such is not the case in our industry as few companies are free to change rates at will because of some form of regulation or the existence of fixed prices for extended periods of time through ordinance or contract.

This set of conditions will force us to employ every reasonable means to control costs of production, transmission and distribution, and it is reasonable to believe, will lead to further development and improvement in our methods and technique. I have the feeling that our industry will meet this challenge as it has long shown itself to be progressive as well as sales-conscious. In these respects I point to the splendid work of the gas appliance manufacturers, and to the accomplishments of the American Gas Association in its Testing Laboratories, its National Advertising Program, and now its development of a planned research program.

The continuing faith of men in the soundness and stability of our form of enterprise is evidenced by the fact that we are witnessing this year major expansions of capacity to several gas pipe line systems. Some of these lines are now under construction and it is understood that one will require more than 400 miles of 26-in. diameter pipe.

The natural gas industry is not one to shrink its responsibilities or close the door to an opportunity to better serve mankind. Surely and certainly "Natural Gas Marches On."

The Domestic Consumer—Each day for millions of American housewives natural gas does those Four Big Jobs that are so essential to modern living.

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PHOTOGRAPHS BY

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JOHN R. LEFF

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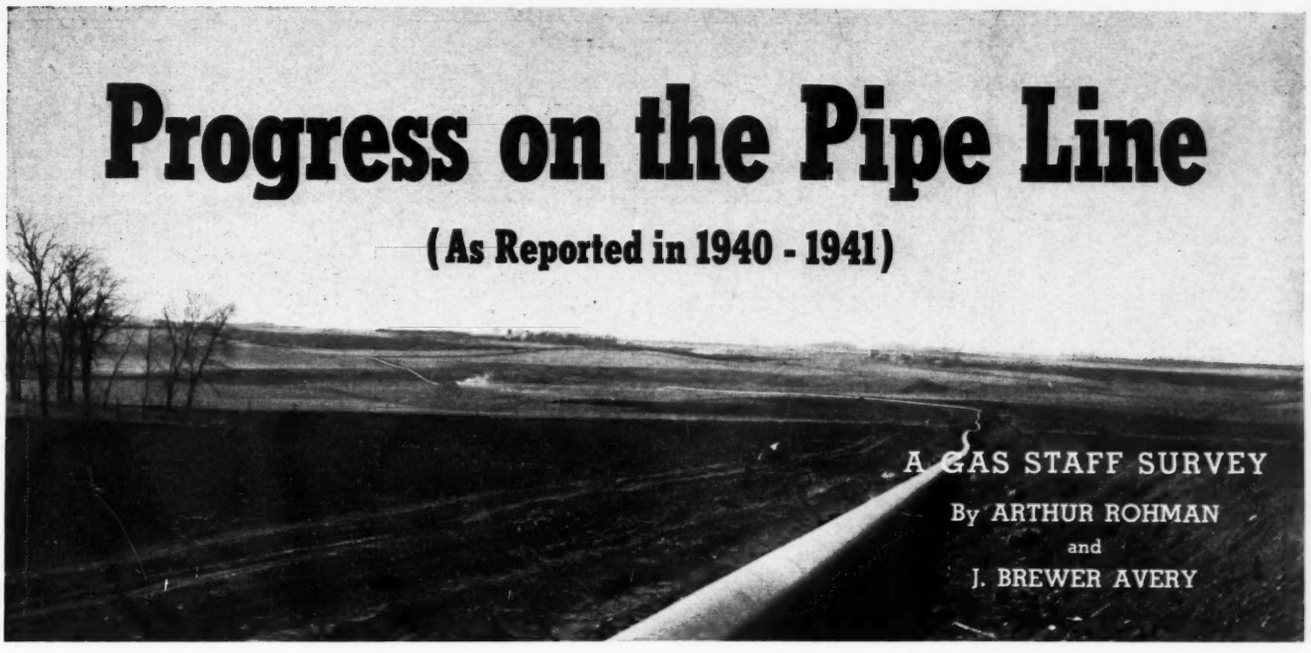
Progress on the Pipe Line

(As Reported in 1940 - 1941)



A GAS STAFF SURVEY

By ARTHUR ROHMAN
and
J. BREWER AVERY

ONCE AGAIN GAS presents its annual survey of natural gas transmission pipe line construction. Of 116 companies queried, 91 replied. The publishers of GAS are grateful to those executives who answered our requests for information. Through their kind assistance the data in the tables on the following pages are complete and authentic.—Editor.

THE best measure of the inevitable forward sweep of the natural gas industry is the progress of its pipe lines, for it is through the expanding network of gathering, transmission and distribution lines that the nation's most economical and flexible fuel flows in ever-increasing quantities to the homes and factories of America.

One hundred companies were queried in preparing this current report of pipe line construction. Fifty-one are listed in the detailed compilation on Pages 57 to 64. Table No. 1 summarizes these data.

Indicative of the gathering momentum of natural gas acceptance in all sections of the country is the fact that the total length, 8453.77 miles of pipe lines reported for 1940 and the first four months of 1941 is more than 3½ times the total length of 2359.96 miles of pipe lines reported for the combined years of 1938, 1939 and the first four months of 1940. (*GAS*, May, 1940, p. 46) In analyzing the figures in this report, the tabulated construction falls into three main categories.

1. New transmission lines built to expand service in territories already partially served, and new lines built to extend service to adjacent territories not previously served.

2. The looping of long distance transmission lines to increase the facilities for serving territories at present enjoying natural gas service. In this category, are found 1261.44 miles of large diameter pipe line in the form of loops on present facilities.

3. New long listance transmission lines which have been proposed to bring natural gas to several densely populated areas. The Federal Power Commission noted in its annual report to Congress, made public recently; that pending before the FPC were applications for permits to construct 3277 miles of natural gas pipe lines to tap Texas fields and open new markets in distant states. Total proposed investment for these lines was $123,250,000.

The proposed lines were listed: Kansas Pipe Line and Gas Co., from Texas Panhandle and Hugoton field in Kansas to Mesaba iron range in Minnesota, 900 miles, $14,550,000; Independent Natural Gas Co., from Texas Panhandle to Milwaukee, Wis., 877 miles, $28,700,000; Reserve Gas Pipe Line Co., from south Texas to New York City, 1500 miles, $80,000,000.

Another phase of natural gas construction that accompanies the building of pipe lines is the installation of new and the increasing of B. H. P. capacity at existing compressor stations. From the figures presented in Table No. 1, the total of added and installed B.H.P. for these stations is 37,090.

This current record of growth is a continuation of the long term trend revealed in Table No. 2, (page 64). In 1939 there were 84,700 miles of natural gas transmission mains. This increased by 1700 the 1938 figure of 83,000, and represents a gain of 6500 over the total for 1933. In spite of its rapid

(Turn to Page 64)

TABLE No. 1. SUMMARY OF DATA OF NATURAL GAS PIPE LINE CONSTRUCTION.

For the period of January, 1940, to April, 1941, of pipe lines completed, building, and proposed as reported by 51 companies.

Total miles reported	8,453.77
Total miles completed and building	2,789.07
Total miles proposed	5,664.70
Reported costs, 36 companies, 6736.07 miles	$190,689 110
Estimated average cost per mile, based on reports of 36 companies	$28,500
Estimated cost of 8453.77 miles (reports of 51 companies)	$240,000,000
Total B. H. P. of compressor stations completed, building, and proposed (partial reports*)	168,040
Total B. H. P. completed and building	37,090
Total B. H. P. proposed (partial reports*)	130,950

*Figures for 15 compressor stations proposed by Reserve Gas Pipe Line Co., Dallas, Texas, not available.

CONSTRUCTION OF NATURAL GAS PIPE LINES - - 1940 - 1941

Based on Data Supplied by 51 Gas Transmission and Distribution Companies

COMPANY	LOCATION OF PIPE LINE (*Origin and Terminus*)	TYPE & PURPOSE OF LINE	STATUS	COST (*Dollars*)	LENGTH (*Miles*)	SIZE (*Inches*)	MAXIMUM CAPACITY (*per 24 hrs.*)	OPERATING PRESSURE (*lbs. sq. in.*)	COMPRESSOR STATIONS	B.H.P. *Installed 1940-41*
Alabama Gas Co., Montgomery, Ala.	From Gadsen, Ala. to Shell Forging Plant, East Gadsen, Ala.**	New line for Industrial Service.	Completed	40,000	4	6	....	High Pressure	.....	.....
Anchor Hocking Glass Corp., Lancaster, Ohio	From Ravenswood Gas Field near Sandyville, West Virginia to Lancaster, Ohio.*	New line for Industrial Service.	Proposed	998,330	....	....	....	....	.....	.....
Arkansas Western Gas Co., Fayetteville, Ark.	From Fayetteville, Ark. to Tontitown, Ark.**	Lateral to serve canning plant, chicken brooders.	Building	.....	2	21 I.D.	....	Intermediate	.....	.....
Note: Combined pop. Tontitown and Cave Springs, 750.	From Fayetteville, Ark. to Cave Springs, Ark.**	Lateral to serve chicken brooders.	Building	.....	5	21 I.D.	....	Intermediate	.....	.....
Godfrey L. Cabot, Inc., Boston, Mass.	West Virginia.**	Gathering and Distribution lines to augment 1000-mile pipe line system in West Virginia.	Completed	.....	22	8	....	....	.....	.....
	West Virginia.**		Completed	.....	2	6	....	....	.....	.....
	West Virginia.**		Completed	.....	12	4	....	....	.....	.....
Canadian River Gas Co., Colorado Springs, Colo.	No new pipe line construction.**	.....	....	.....	....	....	....	....	**Dalhart Station	600
Cities Service Gas Co., Bartlesville, Okla.	From Cunningham Field to Wichita Compressor Station.**	New line to connect production to pipe system.	Completed 1940	.....	61	12¾ O.D.	60 MM c.f.	680	.....	.....
Colorado Interstate Gas Co., Colorado Springs, Colo.	No new pipe line construction.**	.....	....	.....	....	....	....	....	**Devine Station (Two 600-h.p. units)	1200
Colorado-Wyoming Gas Co., Denver, Colo.	No new pipe line construction.**	.....	....	.....	....	....	....	....	**Arapaho station near Littleton, Colo. Operating pressures: 150-300 lbs.	600
Consolidated Gas Utilities Corp., Oklahoma City, Okla.	From 8 miles west of Sterling, Kan. to Sterling, Kan.**	New line tying in new gas field.	Completed Nov. 1940	35,000	8	6	10 MM c.f.	275	.....	.....
	From Elgin, Okla. to Fort Sill, Okla.**	New line to serve estimated 15,000 pop.	Completed Jan. 1941	100,000	16	8	12 MM c.f.	250	.....	.....
Consumers Power Co., Jackson, Mich.	From Midland to McBain.**	New line to bring new gas reserves to present consumers.	Building	825,000	58 6	12¾ O.D. 4½ O.D.	40 MM c.f.	600	Six Lakes Station, Montcalm Co., Mich. Cost: $100,000. Operating pressure: 450 lbs.	1300
Dow Chemical Co., Midland, Mich.	From Michigan Gas Transmission Co. System to plant at Midland, Mich.*	New lines to serve Dow Chemical Plants.	Proposed	.....	125	6	....	....	.....	.....
	From Temple, Mich. Clare County to Plant at Midland, Mich.*		Completed 1940	350,000	55	10	....	....	.....	.....
	From Bay City Field Matagorda County to Plant at Freeport, Tex.*		Proposed	.....	40	8	....	....	.....	.....
	From Anchor Field near Brazori, Tex. to Plant at Freeport, Tex.*		Building	.....	22	8	....	....	.....	.....
El Paso Natural Gas Co., El Paso, Tex. (*Continued*)	In Arizona—two loops between Douglas and Tucson.**	Loop lines added to pipe line system between Lea County Field, N. Mex. and Tucson, Ariz.	Building	1,800,000	84	10¾	138 MMc.f.	650	*Douglas, Ariz.	800
	In New Mexico—two loops.**				51.5	12¾		750	*Benson, Ariz.	800
	In Texas—three loops.**				68.3	16		500	Cost: $106,000.	

**Report confirmed by Company.
*Report based on news release.

Company	Location of Pipe Line (*Origin and Terminus*)	Type & Purpose of Line	Status	Cost (*Dollars*)	Length (*Miles*)	Size (*Inches*)	Maximum Capacity (*per 24 hrs.*)	Operating Pressure (*lbs. sq. in.*)	Compressor Stations	B.H.P. *Installed 1940-41*
El Paso Natural Gas Co., El Paso, Texas (*Continued*)	From Duncan, Ariz. to Morenci, Ariz.*	New line to serve Morenci, Ariz.	Proposed	.....	35	6	....	....	.....	.....
	From near St. David, Ariz. to Ft. Huachuca, Ariz.*	New line to serve Military Post.	Proposed	.....	24	3½	....	....	.....	.....
	From near Red Rock, Ariz. to Hayden, Ariz.*	New line to serve copper mine.	Completed	.....	46	....	....	....	.....	.....
Gas Transportation Corp. of Michigan., Mt. Pleasant, Mich.	From Lincoln-Freeman Gas Field to McKay Metering Station, Mt. Pleasant.**	New line to expand service to cities of 12,000 population.	Completed	.....	15	400	2 MM c.f.	250 to 500	.....	.....
Houston Natural Gas Corp., Houston Tex.	From League City to Webster, Tex.**	New line supplying first gas service.	Building	4,617	3.1	2	50 M c.f.	100	.....	.....
New Gas Towns — *Pop.* Webster — 500 East Bernard — 700 Corpus Christi Suburbs — 1,000 Flour Bluff Air Training Station — 10,000 Flour Bluff Estates — 50 Edgewater Terrace — 200 Gardendale Suburbs — 200 — 12,650	From East Bernard Gas Field to East Bernard, Tex.**	New line supplying first gas service.	Completed 1940	2,957	1.22	2	1 MM c.f.	50 to 100	.....	.....
	From Orchard Gas Field to Wallis, Tex.**	Expansion of existing facilities.	Completed Jan. 1941	17,250	3.39 3.40	3 2	2 MM c.f.	150	.....	.....
	From Flour Bluff to Edgewater Terrace, Bellavides, Gardendale Subdivisions, Corpus Christi, Tex.**	New line supplying first gas service.	Completed March 1941	115,000	10½ 4	6 4	10 MM c.f.	60	.....	.....
	From Houston City limits to center of present Houston city loop.**	Expansion of facilities for Houston and suburbs.	Completed Dec. 1940	100,000	4½ 2	12¾ O.D. 16 O.D.	50 MM c.f.	50	.....	.....
Independent Natural Gas Co., Milwaukee, Wis.	From Moore Co. Texas to Milwaukee, Wis.**	Main line to serve territory in Wisconsin.†	Proposed	31,952,478	818 100	22 20	200 MMc.f.	700	Texas 1 Oklahoma 1 Kansas 5 Missouri 1 Iowa 3 Wisconsin 1	108,000 Total
Kansas Pipe Line & Gas Co.,‡ Blackwell, Okla.	From Scott City, Kan. to Indianola, Neb.**	New line to expand present facilities.	Proposed	700,000	130	8	22 MMc.f.	800	Scott City, Kan.	450
New gas town: Bartley, Neb. (Pop. 300).	From Scott City, Kan. to McCook, Neb.**	New line to expand present facitilies.	Building	750,000	145	8	20 MMc.f.	800	.....	.....
Changed over to natural gas: McCook, Neb. (Pop. 6200).	From Cambridge, Neb. to McCook, Neb.**	New line to expand present facilities.	Completed 1940	87,500	15 10	4 6	2 MMc.f.	400	.....	.....
Lone Star Gas Corp., Dallas, Texas	From Normangee, Tex. to Madisonville, Tex.**	New pipe line construction.	Completed 1940	.....	12.1	3	....	100 to 500	.....	.....
	From Page Field, Texas to San Angelo, Texas.**	New line to tie in gas reserves.	Completed 1940	.....	45	8	....	100 to 500	.....	.....
	From Opelika, Texas to Main Line at Trinidad.**	New line to expand present facilities.	Completed 1940	.....	27.6	12	....	150 to 500	.....	.....
	From View Field, Texas to Main Line west of Abilene, Texas.**	New line to tie in gas reserves.	Completed 1940	.....	5.6 1.7	5⁹⁄₁₆ 4	....	100 to 250	.....	.....
	From Groesbeck Field, Texas to line near Groesbeck, Texas.**	New line to tie in gas reserves.	Completed 1940	.....	4.1 0.8	6 7 O.D.	....	100 to 250	.....	.....
Louisiana-Nevada Transit Co., Dallas, Texas *New Gas Towns:* Bradley, Fulton, McNab, Saratoga, Taylor all in Ark.	From Cotton Valley Field, Webster Parish, La. to OKay and Hope Territory, Ark.**	New line to serve additional territory.	Completed 1940	.....	100	8	20 MMc.f.	800	.....	.....

**Report confirmed by Company.
*Report based on news release.
‡Report not confirmed on 900-mile, $14,550,000 proposed pipe line from Texas Panhandle and Hugoton, Kan. to Mesaba Iron Range, Minn.
†This line would serve following cities: Milwaukee, Racine, Madison, Beloit, Burlington, Monroe, Plattville, Sheboygan, Fond du Lac, Oshkosh, Appleton, Two Rivers, Manitowoc, Green Bay, Stoughton. Total pop. 1,490,217.

(Continued to page 60)

CONSTRUCTION OF NATURAL GAS PIPE LINES - - 1940 - 1941

(Continued from page 59)

COMPANY	LOCATION OF PIPE LINE (*Origin and Terminus*)	TYPE & PURPOSE OF LINE	STATUS	COST (*Dollars*)	LENGTH (*Miles*)	SIZE (*Inches*)	MAXIMUM CAPACITY (*per 24 hrs.*)	OPERATING PRESSURE (*lbs. sq. in.*)	COMPRESSOR STATIONS	B.H.P. *Installed 1940-41*
Manufacturers Gas Co., Pittsburgh, Pa.	From Truittsburg, Pa. to Iowa Compressor Station near Brookville, Pa.**	New line to augment service to N. Y. State.‡	Completed Oct. 1940	163,178	16	10 I.D.	....	175	Iowa Compressor Station (Two 500-h.p. units added). Max. discharge: 800 lbs.	1000
	From Iowa Compressor Station, near Brookville, Pa. to Near Olean, N.Y.**	New line to augment service to N. Y. State.‡	Completed Nov. 1940	688,986	71	8	....	800	Iowa, Jefferson Co., Pa. Station (Two 500-h.p. units).	1000
Manufacturers Light & Heat Co., Pittsgurgh, Pa.	From Monaca Reducing Station to 6 mi. north of Elwood City, Pa.**	New line to augment service to N. Y. State.‡	Completed 1940	383,013	12 6	16 O.D. 12 O.D.	....	100 350	Elwood City (2—500-h.p. units) Discharge press.: 350 lbs.	1000
Memphis Natural Gas Co., Memphis, Tenn.	From Monroe Gas Field to Memphis and Jackson, Tenn.**	Four loop lines on Monroe Gas Field to Memphis—Jackson, Tenn. line.	Completed 1940	1,250,000	92	18 O.D.	99 MM c.f.	100 to 400	Guthrie (La.) Sta. (Unit added)	1000
Note: Miss. River crossing of four 10-in. parallel lines constructed 1940. Line serves territory of 500,000 population.	From Monroe Gas Field to Memphis and Jackson, Tenn.**	Four loop lines to extend facilities listed above.	Proposed	915,000	55	18 O.D.	99 MM c.f.	400	.....	.....
Michigan Gas Transmission Corp., Detroit, Mich.	From Montezuma, Ind. to Zionsville, Ind.**	Two loop lines on main line between Illinois-Indiana State line and Zionsville, Ind.	Completed 1940	1,400,000	55	24 O.D.	180 MM c.f.	600	Montezuma Compressor Sta. (Two 1300-h.p. units). Cost: $280,000. Edgerton Compressor Station (New sta.). Cost: $615,000. Zionsville Compressor Station. Cost: $152,000. Oper. press.: 600 lbs. Maximum capacity: 149 MM c.f.	2600 3900 1300
Montana-Dakota Utilities Co., Minneapolis, Minn. *New Gas Towns:* Frazer, Nashua, Poplar, Richey and Wolf Point, all Montana.	From Fort Peck, Mont. to Glendive, Mont.**	New line to serve additional territory.	Completed Oct. 1940	1,000,000	120	8	15 MM c.f.	....	Fort Peck, Saco.	600 540
Mountain Fuel Supply Co., Salt Lake City, Utah	From Powder Wash Field, Colo. to Hiawatha Field, Colo.**	New line to tie-in Powder Wash Field with existing system.	Building	180,000	18	8⅝	10 MM c.f.	500 to 600	.....	.....
Natural Gas Pipeline Co. of America, Chicago, Ill.	From Geneseo, Ill. to Milwaukee, Wis.**	New line to serve additional territory.	Building	3,485,000	164.5	20	123 MM c.f.	712 inlet 200 terminal	.....	.....
Note: (On Geneseo-Milwaukee Line). Contracts to be obtained for town deliveries to 12 gas utilities now serving natural gas. Estimated population of territory to be served: 1,750,000.	From Compressor Station in Monroe Co., Tex. to point in Hansford Co.**	Three loops totaling 219 miles on main line between Tex. Panhandle and Chicago.	Building	.....	33	26	....	700	Moore Co., Tex.	4000
	From Meade Co., Kan. to Pawnee Co., Kan.**		Building	.....	88	26 O.D.	....	700	.....	.....
	From Russell Co., Kan. to Washington Co., Kan.**		Building	.....	98	26 O.D.	....	700	.....	.....
	From Otoe Co., Neb. to Adair Co., Iowa.**	Two loops totaling 184 miles on main line between Tex. Panhandle and Chicago, Est. completion: Oct. 15, 1941.	Proposed	.....	101	26	....	700	.....	.....
	From Mahaska Co., Iowa to Muscatine Co., Iowa.**		Proposed	.....	83	26	....	700	.....	.....
New Mexico Eastern Gas Co., Carlsbad, N. Mex.	From near Loving, N. Mex. to Eddy Co., N. Mex.**	New line to serve 3 potash mines.	Completed 1940	100,000	13 9	4 6	....	....	.....	.....

**Report confirmed by Company.
*Report based on news release.

‡Part of 117-mile line built by Pittsburgh subsidiaries of Columbia Gas & Electric Corp., New York, N.Y. Total Cost: $1,800,000; Annual Delivery: 2,500,000,000 cu. ft.

Company	Location of Pipe Line (*Origin and Terminus*)	Type & Purpose of Line	Status	Cost (*Dollars*)	Length (*Miles*)	Size (*Inches*)	Maximum Capacity (*per 24 hrs.*)	Operating Pressure (*lbs. sq. in.*)	Compressor Stations	B.H.P. *Installed 1940-41*
New Mexico Gas Co., Dallas, Tex.	From Ute Dome, N. Mex. to Kutz Canyon Line, N.W. New Mex.**	New line replacing 6 inch line.	Completed	80,000	9	8	....	500	.....	.....
New Gas Town: Belen, (pop. 3500) Los Lunas (pop. 1000).	From Albuquerque N. Mex. to Belen, N. Mex.**	New line to serve additional territory.	Completed	250,000	30	5⁹⁄₁₆ O.D.	....	250	.....	.....
New York State Electric & Gas Corp., Geneva, N.Y.	From Auburn, N.Y. to Geneva, N.Y.**	Loop line to expand present facilities.	Building	232,000	18	10 I.D.	12 MM c.f.	100	.....	.....
No. Dakota Consumers Gas Co., Fargo, N.D.	From Mandan, N.D. to Fargo and Grand Fork, N.D.*	New line for gas transmission.	Proposed	.....	198	....	....	....	.....	.....
Northern Natural Gas Co., Omaha, Neb. *Towns Added to System* Iowa: Ames, Boone, Estherville, Everly‡, Griswold†, Kensett‡, Nevada, Sergeant Bluff‡, Sutherland‡. Total pop.: 37,461. Minnesota: Hastings, Shakopee‡. Total population: 8080. Nebraska: Boys' Town‡. Total population in area (estimated): 45,521. ‡New gas town.	From Texas to Kansas, Nebraska and Iowa. In Kansas, loop lines from Mullinville, Bushton and Clifton Compressor Stations; in Neb., loop lines from Beatrice and Palmyra Compressor Sta.**	Loop lines totaling 72 mi. giving increased capacity to main line between Texas Panhandle and Minneapolis.	Completed 1940	.....	63 9	24 12	215 M M c.f.	450	Sublette, Kan.; (New Station) Buston, Kan.; (Unit added). Beatrice, Neb.; (Unit added).	3000 1300 1300
	From main line system branch lines to nine towns in Iowa and two towns in Minnesota.**	New lines to serve additional territory.	Completed 1940	.....	59	....	....	....	.....	.....
	From Rawlston, Neb. to Boys' Town, Neb.*	New line to serve community.	Completed 1940	40,000	11	6 & 4	600 M c.f.	....	.....	.....
	From Main Line to Gayville, S.D.*	New line to serve Gayville.	Proposed	20,000	2	....	....	....	.....	.....
Northern Pipe Line Co., Casper, Wyo.	From Casper, Wyo. to Bicley Creek Field near Buffalo, Wyo.**	New line to supplement Buffalo-Sheridan area.	Completed 1940	500,000	65 35	6 4	....	600	.....	.....
Ohio Fuel Gas Co., Columbus, Ohio	No new pipe line construction.*	.....	....	.....	....	....	....	....	Mt. Sterling Compressor Sta. Cost: $330,000.	2700
Oklahoma Natural Gas Co., Tulsa, Okla. Note: Preliminary surveys for pipe line made by aerial photography.	From S. Stroud (Okla.) Gas Field to near Stroud, Okla.**	Loop line to expand present facilities.	Completed 1940	43,000	7.8	6	10 MM c.f.	325 to 225	Hendee Compressor Station.	100
	From Stroud Junction to Ritts Junction.**	Loop line to expand present facilities.	Completed 1940	97,000	8.5	12	15 MM c.f.	300 to 250	.....	.....
	From Crescent Gas Field to near Edmond, Okla.**	New line to expand present facilities.	Completed 1940	143,000	18.1	10	34 MM c.f.	300 to 200	.....	.....
Pacific Gas & Electric Co., San Francisco, Calif. Note: Service to Eureka would mean changeover from manufactured to natural gas.	From Fairfield Knolls, Calif. to near Woodland, Calif.**	New line to expand present facilities.	Proposed	20,000	6	4½	5½ MM c.f.	Up to 500	.....	.....
	From Humboldt Co., Calif. to Eureka, Calif.**	New line to serve Eureka (pop. 800).	Proposed	87,000	14	4½	4 MM c.f.	Up to 500	.....	.....
	From Rio Vista, Calif. to near Woodbridge, Calif.**	New line to expand present facilities.	Building	418,000	20	12¾	70 MM c.f.	Up to 800	.....	.....
Pacific Lighting Corp., San Francisco, Calif.	From Coyote Hills Oil Field, Orange County, Calif. to So. Co's. Gas Co. 6-in. line.**	New line to expand present facilities.	Completed	42,000	2.32	12¾ O.D.	13.5 MM c.f.	95 to 110	.....	.....
	From Aliso Canyon Oil Field near San Fernando, Calif. to So. Calif. Gas Co. 22-in. line.**	New line to expand present facilities.	Completed	53,000	2.94	10¾ O.D.	33 MM c.f.	165 to 200	.....	.....
	From 10-in. line in Orange County, Calif. to Brea Compressor Sta., Orange County.**	New line to expand present facilities.	Completed	50,000	1.74	16 O.D.	33 MM c.f.	175 to 250	.....	.....

**Report confirmed by Company
*Report based on news release.

(Continued to page 62)

CONSTRUCTION OF NATURAL GAS PIPE LINES - - 1940 - 1941

(Continued from page 61)

COMPANY	LOCATION OF PIPE LINE (*Origin and Terminus*)	TYPE & PURPOSE OF LINE	STATUS	COST (*Dollars*)	LENGTH (*Miles*)	SIZE (*Inches*)	MAXIMUM CAPACITY (*per 24 hrs.*)	OPERATING PRESSURE (*lbs. sq. in.*)	COMPRESSOR STATIONS	B.H.P. *Installed 1940-41*
Panhandle Eastern Pipe Line Co., Kansas City, Mo.	From Hugoton, Kan. to Illinois-Indiana State Line:** In Kansas: 4 loops, 102.9 mi. of 24-in. In Missouri: 3 loops, 28.88 mi. of 24 in., 26.23 mi. of 22 in., 3.89 mi. of 18-in. In Illinois: 3 loops, 29.42 mi. of 24 in., 27.97 mi. of 22 in., 23.79 mi. of 20-in.	Loop lines to increase capacity on main line from Hugoton, Kan. to Illinois-Indiana State Line.	Completed 1940	6,300,000	161.20 54.23 23.79 3.89	24 22 20 18	....	450 to 500	Hansford Station, Hitchland, Texas (New station). Sneed Station, Stinnett, Texas (Unit added). Glenarm (Illinois) Station (Unit added).	3900 1300 1000
Pennsylvania Fuel Supply Co., Pittsburgh, Pa.	From Rimersburg Compressor Station to Truittsburg, Pa.**	New line to augment service to N. Y. State.‡	Completed 1940	122,442	12	10 I.D.	....	175	Rimersburg Compressor Station overhauled.	.....
Philadelphia Co. & Subsidiaries, Philadelphia, Pa.	From Kentucky to Northern West Virginia.*	New line for gas transmission.	Proposed	.....	190	20	....	....	.....	.....
Public Service Co. of Colorado, Denver, Colo.	From Piceance Creek, Colo. to Grand Junction, Colo.*	New line to serve mining and industry.	Proposed	.....	60	....	....	....	.....	.....
Republic Natural Gas Co., Dallas, Texas	Hugoton Field, Texas County, Okla.*	New field gathering line.	Building	.....	21½	....	....	....	.....	.....
Reserve Gas Pipe Line Co., Dallas, Texas Note: This line would serve Metropolitan New York area; Total pop.: 14,500,000; approximate number of meters, 3,500,000.	From Hardin County, Texas to Elizabeth, N.J.**	Main transmission line to serve New York area.	Proposed	80,000,000	1,406	26	300 MM c.f.	800 Gauge Discharge 473 Gauge Intake	15 Planned	.....
Santa Maria Gas Co., Santa Maria, Calif.	From West of San Luis Obispo to U.S. Army Camp.**	New line to serve 20,000 officers and enlisted men.	Building	17,500	3.16	6 I.D.	1.68 MM c.f.	60 to 140	.....	.....
Southern California Gas Co., Los Angeles, Calif.	From Rio Bravo, Calif. to Greeley Fields, Kern Co., Calif.**	New line to tie-in gas fields.	Building	.....	1.6 1.7	8 10	....	420 to 400	.....	.....
	From Kettleman Hills, Calif. to Lemoore Jct., Calif.**	New line completes 10-in. parallel line.	Completed 1940	.....	5	10	....	400 to 350	.....	.....
Southern Counties Gas Co., Los Angeles, Calif.	Chino, Calif.**	Looping of transm'n. line.	Building	70,000	5.23	12¾	17 MM c.f.	200	.....	.....
Southern Natural Gas Co., Birmingham, Ala. Note: Lateral lines proposed to Columbus and Macon, Ga.; Montgomery and Selma, Ala. Five lateral lines totaling 82 miles.	From Logansport, La. to Perryville, Ala.**	New line to augment present field supply.	Building	2,250,000	135	14 O.D.	70 MM c.f.	1200	Barnesville, Ga. (New Sta.)...	170
	From Main Line in Ala. to Columbus, Ga.**	Loop line to augment existing facilities.	Building	.....	18	12	....	450	*19 Units Proposed for* Perryville, La. Onward, Miss. Pickens, Miss. Louisville, Miss. Tarrant, Ala. Selma, Ala. Ben Hill, Ga.	13,500
	From Monroe, La. to Atlanta, Ga.**	Loop line to augment existing facilities.	Completed 1941	.....	80	22	....	....		
	From Main Line at Rome, Ga. to Chattanooga, Tenn.**	New line to supply additional territory.	Proposed	425,000	45	8⅝	1 MM c.f.	800		
Southern Light & Power Co., Lawton, Okla.	From Walters Gas Field to Temple, Okla.**	New line to change source of supply to Temple.	Completed Dec. 1940	30,000	12.5	4½ O.D.	1.4 MM c.f.	60	Walters Gas Field.	80
Tennessee Gas & Transmission Co., Chattanooga, Tenn.	From Louisiana gas fields to Asheville, N.C.*	Main line to serve major cities in Tenn. & N. C.	Proposed	24,000,000	1,425	....	....	....	.....	.....

**Report confirmed by Company.
*Report based on news release.

‡Part of 117-mile line built by Pittsburgh subsidiaries of Columbia Gas & Electric Corp., New York, N.Y. Total Cost: $1,800,000; Annual Delivery: 2,500,000,000 cu. ft.

Company	Location of Pipe Line (*Origin and Terminus*)	Type & Purpose of Line	Status	Cost (*Dollars*)	Length (*Miles*)	Size (*Inches*)	Maximum Capacity (*per 24 hrs.*)	Operating Pressure (*lbs. sq. in.*)	Compressor Stations	B.H.P. *Installed 1940-41*
Toledo Edison Co., Toledo, Ohio.....	From Texas-Detroit line to Defiance, Ohio.**	New line: Defiance (pop. 9744) changed over from manufactured gas.	Completed 1940	29,705	3.85 2.11	3½ O.D. 4½ O.D.	....	500 100	.....	.....
	IN FLORIDA									
United Gas Pipe Line Co., Shreveport, La.....	From Pensacola Line to Florida Pulp and Paper Co., Escambia County.**	New line expanding present facilities.	Building	29,000	3.46	6	....	....	.....	.....
	IN LOUISIANA									
	From Lirette Field to Baton Rouge-New Orleans Line.**	New line expanding present facilities.	Completed 1940	746,000	34.78 1.92	12 10	....	....	.....	.....
	From Lirette Field line to Godchaux Sugars, Inc.**	New line expanding present facilities.	Completed 1940	34,000	3.42	6	....	....	.....	.....
	From Abbeville field to Acadia line.**	New line expanding present facilities.	Completed 1940	14,000	2.30	4	....	....	.....	.....
	From Abbeville field to Milton Cane Products line, Lafayette Parish.**	New line expanding present facilities.	Completed 1940	110,000	10.31	8	....	....	.....	.....
	From Franklin line to Iberia Co-op. Sugar Mill.**	New line expanding present facilities.	Completed 1940	21,000	2.98	4	....	....	.....	.....
	From Koran Gasoline Plant to Sligo Field.**	New line expanding present facilities.	Completed 1940	66,000	7.49	8	....	....	.....	.....
	In Tiger Lake Swamp.**	New line expanding present facilities.	Building	25,000	2.03	6	....	....	.....	.....
	From Lirette Field line to Valentine Sugars, Inc.**	New line expanding present facilities.	Completed	35,000	4.75	4	....	....	.....	.....
	From Raceland Field to Lirette Field line.**	New line expanding present facilities.	Building	15,000	1.12	6	....	....	.....	.....
	From De Large Field to Lirette Field Line.**	New line expanding present facilities.	Building	100,000	14.00	4	....	....	.....	.....
	IN MISSISSIPPI									
	From Jackson Compressor Station to Jackson Gathering System.**	New line expanding present facilities.	Completed 1940	17,000	1.68	8	....	....	.....	.....
	IN TEXAS									
	From line in Bexar County to Brooks Field (U.S. Army).**	New line expanding present facilities.	Completed 1940	9,000	1.31	4	....	....	.....	.....
	From line in Wood County to Hawkins.**	New line expanding present facilities.	Completed 1940	7,000	1.54	4	....	....	.....	.....
	From Orange Lateral to Atlantic Refining Co., Atreco.**	New line expanding present facilities.	Completed 1940	38,000	2.65 0.55	8 6	....	....	.....	.....
	From Joaquin Field to line in Shelley County.**	New line expanding present facilities.	Completed 1940	55,000	4.20	10	....	....	.....	.....
	From Willow Slough Field to Port Arthur line, Jefferson Par., La.**	New line expanding present facilities.	Building	196,000	2.60 14.70	10 8	....	....	.....	.....
	From West Beaumont Field to Port Arthur line, Jefferson Co., Tex.**	New line expanding present facilities.	Building	23,000	1.38	8	....	....	.....	.....
	From Port Arthur line to Gulf Coast Steel Barrel Co.**	New line expanding present facilities.	Building	15,000	1.73	4	....	....	.....	
	From Satsuma Field to Katy-Satsuma line, Harris County.**	New line expanding present facilities.	Proposed	36,000	5.70	6	....	....	.....	.....

**Report confirmed by Company.
*Report based on news release.

(Continued to page 64)

CONSTRUCTION OF NATURAL GAS PIPE LINES - - 1940 - 1941

(Continued from page 63)

Company	Location of Pipe Line (*Origin and Terminus*)	Type & Purpose of Line	Status	Cost (*Dollars*)	Length (*Miles*)	Size (*Inches*)	Maximum Capacity (*per 24 hrs.*)	Operating Pressure (*lbs. sq. in.*)	Compressor Stations	B.H.P. *Installed 1940-41*
West Texas Gas Co., Lubbock, Texas.....	From North Cowden Pool to Odessa, Texas.**	Expansion of existing facilities.	Building	66,500	13.7	6⅝ O.D.	....	500	.....	.....
New Gas Towns: Ropesville and Meadow (pop. 1000).	From Brownfield to Ropesville, Texas.**	New line to serve additional territory.	Building	60,500	17	4½ O.D.	....	.....	.....	.....
Western Natural Gas Co., El Paso, Texas.....	From Hugoton, Kan. to Milwaukee area.**	Main line to serve territory of 1,425,000 pop.	Proposed	26,208,154	802	26	230 MM c.f.	510	At Field. Near Shenandoah, La.	4500 4500

**Report confirmed by Company. *Report based on news release.

TABLE No. 2. MILES OF MAIN IN USE BY THE NATURAL GAS INDUSTRY IN THE UNITED STATES (1933-1939)

	1939	*1938*	*1937*	*1936*	*1935*	*1934*	*1933*
Transmission....	84,700	83,000	81,600	80,500	79,600	78,800	78,200
Distribution.....	105,600	103,600	101,800	98,500	95,400	94,200	92,800
Total.....	190,300	186,600	183,400	179,000	175,000	173,000	171,000

Statistical Department, American Gas Association, March 24, 1941.

(*Continued From Page 57*)

growth, the natural gas industry has throughout the past 75 years paid its own way practically without benefit of public subsidies and, at the same time, has made substantial reductions in the prices of its products. In only a few instances has anything approaching public aid been given for pipe lines. These few instances relate only to the occupancy of small pieces of the public domain for right-of-way purposes and pumping stations.

Actual records, as reported in "Public Aids to Transportation," released by Joseph H. Eastman, chairman of the Interstate Commerce Commission and former Federal Coordinator of Transportation, reveal that only $2,954 worth of public lands are used by pipe lines, and that the estimated value of additional acreage occupied increased this amount to the negligible total of $76,921. In contrast, the study has revealed that public aid to the railroads has amounted to approximately $1,443,000,000.

The ever-expanding growth of the natural gas industry, as evidenced by the pipe line construction activities of the past three years, indicates that the industry must face certain problems in connection with the territories which it seeks to serve and the reserves which are at present available. Every executive in the natural gas industry is aware of the increasing governmental interest in the industry. Much of this interest is concerned with the protection of natural gas as a valuable national resource. In this connection a further quotation from the Federal Trade Commission Monograph No. 36 is presented:

"As in all underground natural resources, there is a wide variation in estimates of natural gas reserves in the United States. A recent statement of such estimates appears in report on 'Energy Resources and National Policy,' National Resources Committee, January 1939, pages 130, 131, 133, 137, 138, 295. Estimates have varied from 30 trillion cu. ft. made in October, 1931, by H. O. Caster, president of the American Gas Association in that year, to 66 trillion cu. ft., in April 1938, by Ralph E. Davis, a natural gas engineer. Of this 66 trillion cu. ft., the Appalachian area had 6 trillion, or 9%, and the midcontinent and Gulf coast, which includes Louisiana, had 51 trillion, or 77.27%. Still more specifically, the Texas Panhandle with 16 trillion cu. ft., and the adjacent Hugoton, Kan., field, with 14.25 trillion cu. ft., comprise in that area of something over 2,000,000 acres, nearly one-half the present known natural gas reserves of the United States (131, 137-138). As of October, 1938, Ralph W. Richards, of the United States Geological Survey, estimated the natural gas reserves at 100 trillion cu. ft. The difference between the estimates of Davis and Richards is said to be due largely to the discovery of important reservoirs in the California and Rocky Mountain areas, which have occured at such a rate that the National Resources Committee concludes:

"On the whole, these estimates indicate that natural gas, as well as crude oil, is being discovered more rapidly than it is being consumed (130-131)."

It is the hope of *GAS* that the tables published on the foregoing pages will not only contain specific information of value to men in the industry, but that the trends which are presented by the figures in these tables are fore-shadowing an expansion of natural gas service far greater than present expectation.

■ ■

Gas Distributing System Sold in Brenham, Texas

The official transfer of the Brenham properties of the Texas Cities Gas Co., Dallas, Texas, to the Texas Southwestern Gas Co. took place recently, following approval in Washington by the Securities Exchange Commission of the plan of the transfer.

Agreement for sale of the Brenham gas distribution system was reached in January, subject to approval of the SEC.

Detroit Consumers Vote Against City Ownership

THE recent election held in Detroit, Mich., to determine whether or not the city would acquire the distribution system and properties of the Michigan Consolidated Gas Co., resulted in an approximate three-to-one vote against municipal ownership of the system. The election climaxed two months of debates between city officials and company officers in regard to the question, which began when the company lowered domestic but increased house-heating rates in Detroit.

Panhandle Eastern Pipe Line Co., Kansas City, Mo., has filed with the Federal Power Commission a separate answer to the complaint filed by the city of Detroit and county of Wayne against it and the Michigan Gas Transmission Corp. requesting an investigation of rates for natural gas sold by Panhandle Eastern to Michigan Consolidated Gas Co. for resale in the Detroit area. The defendant asked that the petition of the complainants be denied, or in the alternative that the investigation be postponed pending further developments with respect to Panhandle Eastern's proposed acquisition, in the near future, of the properties of the Michigan Gas Transmission Corp.

The company stated that, as a result of its studies, it believes that it will soon be in a position to offer a new rate to Michigan Consolidated and that negotiations will develop a rate which will satisfy the complaint filed with the commission.

The natural gas which is distributed by the Michigan Consolidated Gas Co. in the Detroit area is transported from fields in Texas and Kansas by Panhandle Eastern Pipe Line Co. through its own facilities to the Illinois-Indiana state line and for the balance of the distance to Detroit through the Michigan Gas Transmission Corp.

■ ■

Oklahoma Contracting Co. To Construct Pipe Lines

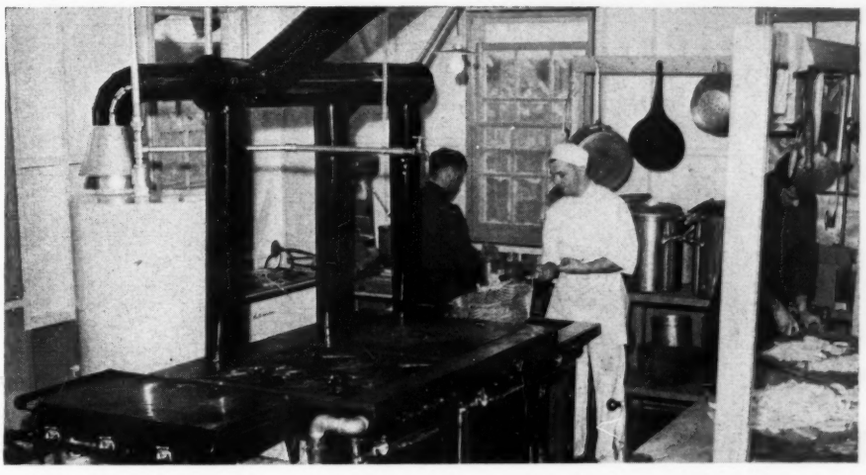
The Oklahoma Contracting Co. of Texas has been granted a charter to engage in pipe line construction work in the gas, oil and gasoline industries. T. R. Jones is chairman of the board of the new company; T. A. Hester is president; Paul R. Halbert, vice president, and N. K. McFarland, secretary and treasurer. T. R. Jones is also president of T. R. Jones Inc., with Mr. Hester and Mr. Halbert having been identified with the same firm. N. K. McFarland was formerly associated with W. G. Hanrahan of Dallas. Offices of The Oklahoma Contracting Co. are maintained in the Magnolia Building, Dallas, Texas. The company is at present working on a pipe line project for Stanolind Pipeline Co. and was awarded another contract recently by Socony-Vacuum.

■ ■

North Dakota Commission Grants Time Extension

The North Dakota Public Service commission has granted an extension to August 8, 1942, of the time for commencement of actual construction of a natural gas pipe line from Mandan, N. D., to Fargo and Grand Forks, N. D.

The extension was granted to the North Dakota Consumers' Gas Co., of Fargo, holder of a certificate of public convenience and necessity. The proposed extension would bring natural gas from the Baker, Mont., fields. From Mandan to Fargo is a distance of 189 miles. It is 75 miles from Fargo to Grand Forks. The pipe line would also serve a number of other towns in the Red River Valley.



One of the 12 new gas-equipped kitchens serving the mess halls at Camp McQuaide. The mess halls are heated with eight cabinet type circulating gas heaters.

Natural Gas for Camp McQuaide

UNCLE SAM became a customer of Coast Counties Gas and Electric Co., Santa Cruz, Calif., this month when gas was turned into $75,000 worth of cooking, heating and water heating equipment at Camp McQuaide, on Monterey Bay, six miles from Watsonville, Calif.

Camp McQuaide is home of the 250th Coast Artillery, the fourth Army's mobile big gun regiment. A $500,000 building program was completed there this month which makes the camp a permanent part of the nation's defense program and an artillery training school where 1800 officers and men are quartered.

Gas-fired heating equipment at Camp McQuaide includes thermostatically-controlled forced air central heating plants in the administration building, the post exchange, the fire house, recreation hall, the guard house, three repair sheds, utility building and the warehouse. The 1000 seating capacity theatre is served by a steam heated forced air system from a two-section boiler.

Three high-pressure, 50 hp. gas-fired steam boilers serve both heating and water heating in the 100-bed hospital at Camp McQuaide. Heating is accomplished by means of cast iron radiators and a series of steam forced air heaters. Each of the 12 mess halls are equipped with eight cabinet type circulating heaters and gas cabinet type circulators also heat the 547 tents occupied by the officers and men. Automatic storage water heaters serve the mess halls and other buildings besides the hospital, while multi-coil, instantaneous water heaters are used in the washrooms and showers.

The cooking equipment consists of heavy-duty hotel type gas ranges with supplementary deep fat fryers in each of the mess kitchens. These form an interesting contrast to the old wood-burning equipment used at Camp McQuaide for many years.

To supply Camp McQuaide, Coast Counties Gas and Electric Co. laid a 4-in. main, connecting with its transmission main which parallels the Santa Cruz-Watsonville highway (State highway No. 1), approximately six miles distant.

Organized in 1909 as the First California Coast Defense Command, the 250th Coast Artillery has, under various designations, served in the Spanish-American war, the Philippine Insurrection and in World War I. One unit, re-designated the 1st Army Artillery Park, served overseas during World War I in the St. Mihiel and the Meuse-Argonne offensives. The 250th was one of the first outfits to be inducted into Federal service in the present emergency. Colonel David P. Hardy, Camp McQuaide's commanding officer, helped plan the establishment of the camp. He has seen a modern military city grow up on the palisades overlooking the Pacific—a model artillery unit, streamlined to meet present-day defense tactics, yet clean and sanitary in every respect.

Camp McQuaide is based on 700 acres of land formerly occupied by farms. It was purchased by the government from old-time families whose ownership dates back to the time the Spanish padres first traversed the region in 1775, on their way north to found the cities of San Francisco and San Jose.

ASSOCIATION *Activities*

Natural Gas Convention Leaders

THE 36th Annual Natural Gas Convention of the American Gas Association, now under way in Dallas, Texas, promises to be the finest meeting that this group has yet had. Conventionites are now gathering at two hotels—the Adolphus and Baker, and expect to enjoy the most interesting program of the year.

Largely responsible for this meeting are the convention committee chairmen who have given freely of their time in order that the convention be a success. The various committee chairmen are:

General Committee: H. D. Hancock, chairman, Natural Gas Section; president, Gas Advisers, Inc., New York, N. Y.

General Arrangements Committee: D. A. Hulcy, president, Lone Star Gas Co., Dallas, Texas.

Program Committee: J. French Robinson, vice chairman, Natural Gas Section; president, The East Ohio Gas Co., Cleveland, Ohio.

Reception Committee: R. G. Soper, president, The Dallas Gas Co., Dallas, Texas.

Ladies' Committee: Mrs. D. A. Hulcy, Dallas, Texas.

Housing Committee: Z. E. Black, convention manager, Chamber of Commerce, Dallas, Texas.

Entertainment Committee: A. S. Johnson, president, Southern Union Gas Co., Dallas, Texas.

Publicity Committee: Will C. Grant, advertising director, Lone Star Gas Co., Dallas, Texas.

The Natural Gas Section committee chairmen are:

Executive Committee: H. D. Hancock, president, Gas Advisers, Inc., New York.

Managing Committee: H. D. Hancock.

Advisory Committee: Elmer F. Schmidt, vice president and operating manager, Lone Star Gas Co., Dallas, Texas.

Production Committee: E. L. Rawlins, Union Producing Co., Shreveport, La.

Transmission Committee: Julian L. Foster, general superintendent, Lone Star Gas Co., Dallas Texas.

Industrial and Commercial Gas Sales Committee: H. Carl Wolf, president, The Atlanta Gas Light Co., Atlanta, Ga.

Residential Gas Sales Committee: F. M. Rosenkrans, new business manager, The Gas Service Co., Kansas City, Mo.

Main Technical and Research Committee: H. C. Cooper, Gas Companies, Inc., Pittsburgh, Pa.

Gas Measurement Sub-committee: Thos. R. Weymouth, Columbia Gas and Electric Corp., New York, N. Y.

Pipe Line Sub-committee: H. D. Hancock.

Sub-committee on Gas Well Deliveries: N. C. McGowen, president, United Gas Pipe Line Co., Shreveport, La.

Sub-committee on Code for Testing Natural Gas for Gasoline Content: George P. Bunn, manager, natural gas department, Phillips Petroleum Co., Bartlesville, Okla.

Sub-committee on Dust Prevention: T. H. Kerr, vice president, The Ohio Fuel Gas Co., Columbus, Ohio.

Nominating Committee: E. F. Schmidt.

Time and Place Committee: G. J. Neuner, vice president, Panhandle Eastern Pipe Line Co., Kansas City, Mo.

Wrinkle Committee: V. A. Ogilvie, engineer and director, Gas Advisers, Inc., New York, N. Y.

Wrinkle Award Committee: Don Sillers, superintendent gas measurement, Lone Star Gas Co., Dallas, Texas.

Committee on Supply Men's Fund: George E. Welker, president, United Natural Gas Co., Oil City, Pa.

Sub-committee on Accident Prevention: W. H. Adams, safety director, The Manufacturers Light and Heat Co., Pittsburgh.

Engineers' Committee on Industrial Gas Data: George M. Parker, assistant to vice president and manager, Mississippi River Fuel Corp., St. Louis, Mo.

These men have all contributed to the success of the organization and the furtherance of the natural gas industry.

The meeting will also present an exhibit of summer air conditioning by gas under the auspices of the Natural Gas Section. This will be in the Baker Hotel. Several of the companies active in the promotion of this new use of gas will demonstrate equipment. They are: The Bryant Heater Co., Cleveland, Ohio; the Mills Novelty Co., Chicago, Ill.; Servel, Inc., Evansville, Ind.; Surface Combustion Corp., Toledo, Ohio; and the Williams Oil-O-Matic Heating Corp., Bloomington, Ill. Not only are there set up complete units for summer air conditioning but each display features charts, photographs and sales literature which can be fully explained by representatives of the companies who are there.

Entertainment features of the convention include golf privileges at several Dallas country clubs, a Stag Open House on Tuesday evening, a special program "for the ladies," and the Fiesta Ball, to be held on Wednesday evening in the grand ballroom of the Hotel Adolphus. In addition there will be the previously announced post-convention tour to Old Mexico.

■ ■

Florida-Georgia Association

The meeting of the Florida-Georgia Gas Meters Association, held in Hollywood, Fla., on April 20, 21 and 22, began with a party and dinner-dance on Sunday, April 20. The general sessions meeting, on Monday morning, was under the general chairmanship of J. W. Owen. This session was opened by C. D. Littlefield, president of the Association, and featured an address, "What Further Cooperation," by W. F. Roberts, president, Standard Gas Equipment Corp., Baltimore, and a color sound movie, "Fun in the Kitchen," introduced by Lloyd Ginn, American Stove Co., Cleveland. The general session meeting on Tuesday featured two addresses, "The Great American Salesman," by Lloyd Ginn, and "Defense," by Percy Wyly, II, Federal Bureau of Investigation.

The afternoon sessions were divided into Residential, Commercial, Technical and Accounting divisions, under the chairmanship of Ted Bergman, H. E. Marsolf, J. O. Sholar, and E. H. Phillips, respectively. At these meetings were presented many papers of interest to the men engaged in these branches of the industry.

J. F. ROBINSON
Vice Chairman

E. L. RAWLINS
Production

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Transmission

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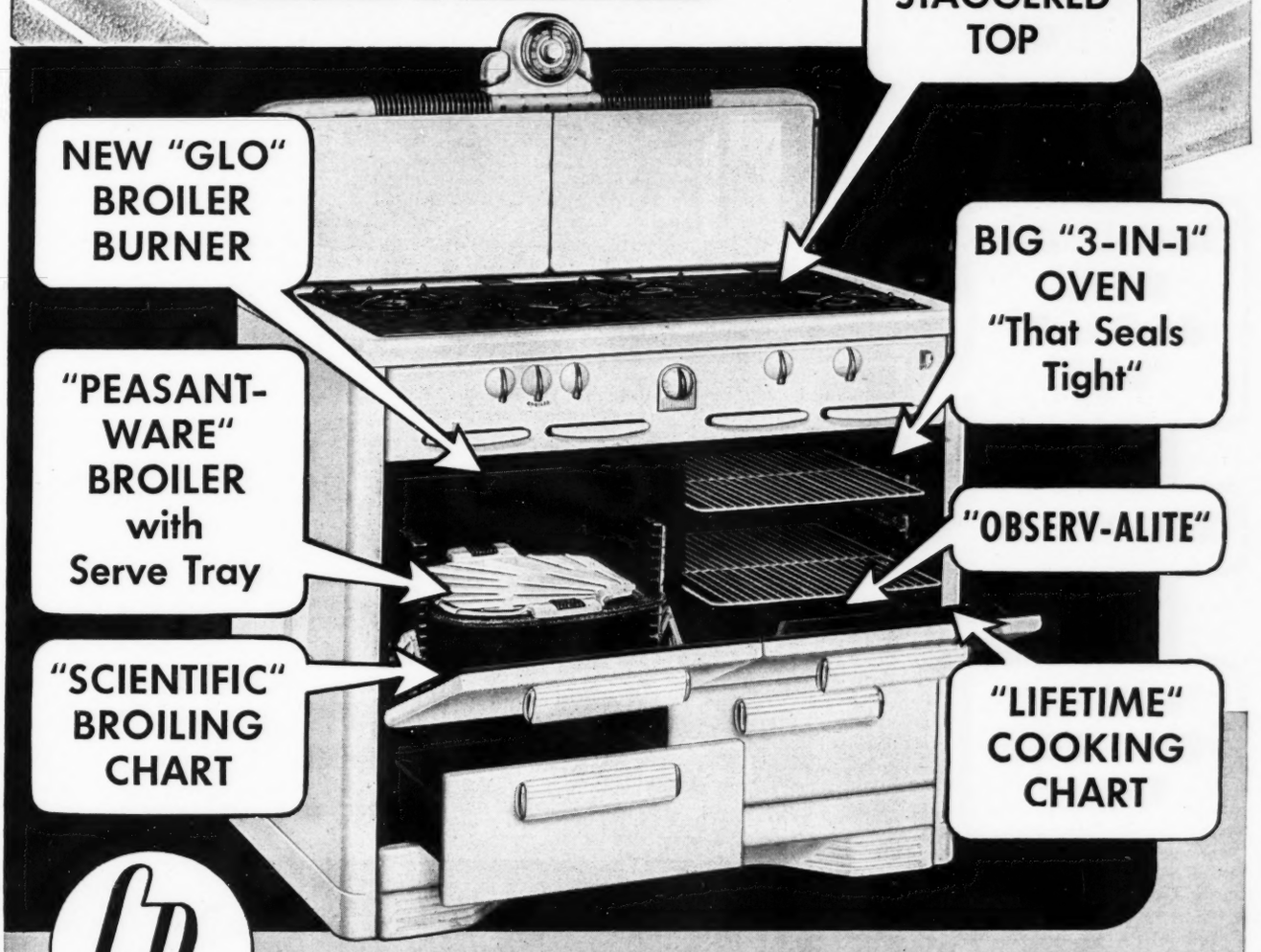

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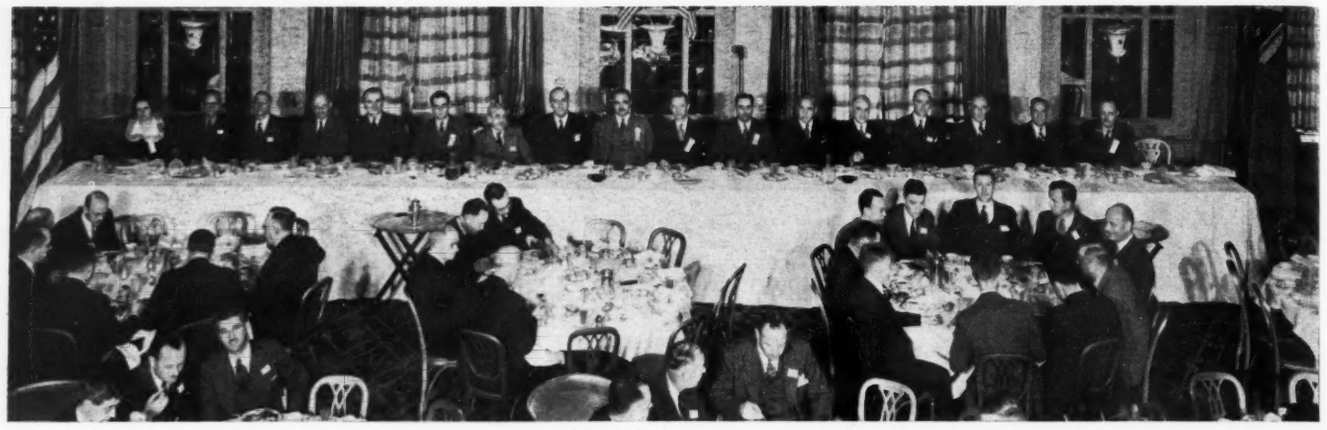

At the speakers' table of the National Defense Luncheon at the American Gas Association Distribution Conference were (reading from left to right): Gladys Hanshaw, A.G.A.; C. S. Goldsmith, vice chairman, Distribution Committee, New York; J. D. Von Maur, Toronto, Canada; S. C. Preston, president, Peoples Natural Gas Co., Pittsburgh, Pa.; D. S. Keenan, president, Carnegie Natural Gas Co., Pittsburgh, Pa.; H. L. Gaidry, vice chairman, Technical Section, New Orleans, La.; J. B. McNary, president, Canadian Gas Association, Hamilton, Ontario, Canada; Major T. J. Strickler, president, A.G.A., Kansas City, Mo.; R. H. Clark, chairman, Committee on Operation of Public Utility Motor Vehicles, New York, N. Y.; D. P. Hartson, chairman of luncheon, chairman Technical Section, Pittsburgh, Pa.; L. W. Tuttle, chairman, Distribution Committee, Oak Park, Ill.; C. E. Paige, president, The Brooklyn Union Gas Co., Brooklyn, N. Y.; Major Alexander Forward, managing director, A.G.A., New York, N. Y.; E. P. Durfee, New York, N. Y.; P. H. McCance, vice president, Philadelphia Co., Pittsburgh, Pa.; C. E. Bennett, president, the Manufacturers Light and Heat Co., Pittsburgh, Pa.; A. Gordon King, secretary, Technical Section, A.G.A., New York, N. Y.

Distribution Conference

GAS staff report by Elliott Taylor: The increasing gravity of the international situation, and the necessity for the gas industry to speedily complete plans to insure an uninterrupted and adequate supply of fuel for industry as well as homes regardless of what course affairs may take, occupied the spotlight in the deliberations of the 18th annual Distribution Conference and the first annual Conference on the Operation of Public Utility Motor Vehicles, held in Pittsburgh, Pa., April 21 to 23.

Registrations of well over 400 delegates established another record breaking attendance for a Distribution Conference, and the number and caliber of the papers presented were universally declared to be up to the high technical standards established in previous years.

L. W. Tuttle, chairman of the Distribution Committee, presided at the sessions of the technicians of the gas industry, and the meetings of public utility fleet operators were under the chairmanship of R. H. Clark.

Interesting outside diversions were a conducted visit through the plant of the Pittsburgh Equitable Meter Co., followed by a buffet supper with the conference as guests, and an inspection trip through the Mellon Institute, showing the facilities available there for gas research.

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Southwest Short Course

GAS staff report by O. D. Hall: Rapid growth of the natural gas industry within the past 10 years, coupled with a desire to give maximum service to the nation and customers in the present emergency, brought out a record-breaking attendance at the 18th Annual Southwestern Gas Measurement Short Course, at Norman, Okla., April 15-17.

Enrollment reached 705. Twenty-three states and Old Mexico were represented in the sessions and classes. The course was sponsored by the College of Engineering, University of Oklahoma, assisted by the Corporation Commissions of Oklahoma and Kansas, Railroad Commission of Texas; Oklahoma Utilities Association, Natural Gas Section, American Gas Association, and Natural Gasoline Association of America.

G. W. McCullough, Bartlesville, Okla., was elected chairman of the General committee for the 1942 short course, succeeding R. L. Rountree, United Gas Pipe Line Co., Shreveport, La. Mr. McCullough is chief engineer of the natural gasoline and gas departments, Phillips Petroleum Co., Bartlesville, Okla. He started with the organization 16 years ago as a draftsman in the engineering department.

"Outside control of the gas industry will come if it fails to prepare its people and its plants in advance to meet any serious emergency," said T. J. Strickler, vice president and general manager of the Kansas City Gas Co., Kansas City, Mo., and president of the A.G.A. He declared that the industry is now doing its job well, but advised careful training of employees, adequate provision for protection, and in case of dislocation, prompt restoration of gas service.

E. H. Poe, New York City, secretary, Natural Gas Section, A.G.A., expressed pride in the gas and oil industries and declared that there is hardly a thing being done in national defense industries in which gas does not have a part.

"We may soon be living in houses entirely built of materials manufactured from natural gas through synthetic processes," declared William F. Lowe, Tulsa, Okla., secretary, Natural Gasoline Association of America. He said that men's suits can be made, by synthetic processes, using gas, which will be cheaper and more durable than clothing that we now wear.

"Your interests will be better conserved through the type of state regulation you have had than through complete federal control which may come in the future if the gas utilities fail to cooperate with the present state regulatory bodies and attempt to obstruct their legitimate functions," Andrew F. Schoeppel, chairman of the Kansas Corporation Commission, told school attendants.

Technical papers on the general assembly programs, which were accompanied by illuminated slides, included, "Fundamental Principals of Orifice Meters," by A. D. MacLean, Pittsburgh Equitable Meter Co.; Fundamen-

R. L. Rountree, chairman of the general committee, opening the Southwestern Gas Measurement Short Course.

W. H. Carson, dean of the College of Engineering, delivering the opening session address.

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Above (left to right): Lester J. Eck, Minneapolis Gas Light Co.; Burt R. Bay, Northern Natural Gas Co.; E. J. Boyer, Minneapolis Gas Light Co.; H. E. Peckham, new president, Midwest Gas Association; H. K. Wrench, Minneapolis Gas Light Co.; R. B. Searing, secretary-treasurer, Midwest Gas Association; John K. Knighton, Servel, Inc.; George B. Benton, Minneapolis-Honeywell Regulator Co.

tal Principles of Displacement Meters," by A. F. Benson, American Meter Co., Inc.; and "Fundamental Principles of Regulators," by K. R. D. Wolfe, Fisher Governor Co.

Prize papers on, "What I Learned at the (1940) Gas Measurement Short Course," were awarded as follows: First prize, $15, Sibyl McKay, Victor Gasoline Co., Tulsa Okla.; Second prize, $10, R. O. Cox, Lone Star Gas Co., Dallas, Texas; five third prize winners of $5 each, B. H. Fowler, Phillips Petroleum Co., Bartlesville, Okla.; J. J. Hickey, United Gas Pipe Line Co., Beeville, Texas; Geo. W. Smith, The Gas Service Co., Joplin, Mo.; Herman C. Cowdery, Cities Service Gas Co., Joplin, Mo., and J. B. Reidhimer, Arkansas Louisiana Gas Co., El Dorado, Ark.

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Mid-West Gas Association

GAS staff report by Craig Espy: New president, H. E. Peckham, of the Mid-West Gas Association, was officially inducted into office at the closing sessions of the 36th Annual Convention of the group held in Minneapolis, Minn., April 14, 15 and 16. He succeeds as president, C. B. Dushane, Jr., of the American Meter Co. Taking office with Mr. Peckham are H. K. Wrench, Minneapolis Gas Light Co., 1st vice president, T. E. Rooke, George D. Roper Corp., 2nd vice president and R. B. Searing, secretary and treasurer, the latter by reelection.

New members added to the executive council are J. M. McIntyre, Northern Utilities Co., E. C. Dean, Central Electric and Telephone Co., Elmer Cone, Ruud Mfg., Co., and E. A. Brown, Surface Combustion and Webster Engineering Co., K. R. D. Wolfe, Fisher Governor Co., was elected as affiliation representative on the Management Committee of the American Gas Association in behalf of the Manufacturer's Section, with Lester J. Eck, Minneapolis Gas Light Co., being elected as representative for the Technical Section, E. H. Vieregg, Northwestern Public Service., Accounting Section, and Hal Gildersleeve, Iowa-Nebraska Light & Power Co., Commercial Section and E. L. Fisher, United Light & Power Service Co., Industrial Section.

Total registration fell just short of 300, the figure being an all-time record for attendance. Before retirement C. B. Dushane announced that the 1942 conference will be held in Sioux City, Iowa, at approximately the same dates in April as the current meeting and that the next Ames Meter School will be held September 8, 9 and 10.

Honorable George E. Leach, Mayor of Minneapolis, appeared before the group, with H. K. Wrench giving a response to his address of welcome. In speaking on the subject, "The Gas Industry Faces a Challenge," T. J. Strickler, president, A.G.A., pointed out the fortunate position held by the gas industry. "Our operations are vitally important," he said, "in the prosecution of a program of intensified national defense and in rendering an essential service which is one of the backbones of an effective program of civil defense."

H. A. Watson, A.G.A.E.M., in discussing the CP Range promotion program pointed out that outmoded gas ranges were curtailing gas cookery in 8,000,000 homes. "Gas fuel," he said, "is no better than the appliance it is used in." George B. Benton, Minneapolis Honeywell, told of the mass advertising drive his company is making to sell the notion of automatic heating to the American public. The campaign, he said, is stressing the improvements that have been made in automatic heating, the low cost of installing automatic heating and the low terms available.

Willard F. Rockwell, Pittsburgh Equitable Meter Co., told about the place of the A.G.A.E.M. in the industry. In concluding remarks he said it is quite possible that the manufacturers could reduce prices at least 10% if the gas association and the manufacturers will cooperate in more complete standardization. Although there are millions of gas meters in service, he said, no meter manufacturer is able to manufacture meters for stock because of lack of standardization. He pointed out that the elimination of certain fittings, connections and other parts might cut the number of types by 50% which would automatically double the quantities of production of remaining types.

John K. Knighton, Servel, Inc., talked about air conditioning from the viewpoint of human comfort, winter and summer, directing his remarks at the residential market. Gas-fired air conditioning, he said, will not immediately level-off your sendout, but it is the greatest single factor that can appreciably contribute to this ideal. The summer load represents plus business, he said.

Speaking on the "Natural Gas Industry,"

A few members of the Guild of Ancient Suppliers of Gas Appliances, Skills, Gins, Accessories, and Substances get together in official business meeting at Minneapolis. Seated: J. H. Fagan, Carl Sorby, W. E. Derwent. Standing: Craig Espy, Chet D. Lyford, T. E. Rooke, L. E. Osmer, Paul Kreuch.

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Burt R. Bay, Northern Natural Gas Co., cited the development of new pipeline construction methods that have had a part in the extension of natural gas service and told about factors in the marketing field that have brought about the constantly broadened use of our product.

A. B. Cameron, Phillips Petroleum Co., spoke on the "Development of the Domestic Market for Liquefied Petroleum Gas," pointing out that this industry enjoyed its most successful year in 1940 with 325,000 new customers established for the year, bringing the total consumers to 1,125,000. He stressed greater cooperation between the industries and described the various distribution methods employed by LP-Gas marketers. He recommends that both industries work to the common end of selling gas as a universal fuel for all purposes.

C. George Segeler, A.G.A., gave a talk centering around the application of gas as a chemical agent. He had on display about 100 products made from gas by customers of the gas company. William J. McNally of the Minneapolis Tribune spoke on the background of the present war.

A Cavalcade of Gas presented scenes on the Master Craftsmen, History and Development of Gas, Early Salesmanship, Gas Cooking, Commercial Cooking, Water Heating, Refrigeration, House Heating and Home Service. H. K. Wrench was presented as chairman of this portion of the program with E. Carl Sorby, Geo. D. Roper Corp., serving as master of ceremonies.

The cast included L. C. Ginn, American Stove Co., A. T. Carrow, Cribben & Sexton Co.; R. L. Cox, Detroit Michigan Stove Co.; Elmer Cone, Ruud Mfg.. Co.; C. Speigel, Servel, Inc.; H. Gurney, Surface Combustion Co.; T. E. Rooke, Geo. D. Roper Corp., Frank Kuss, J. H. Fagan Co.; I. Tumler, J. H. Fagan Co.; L. A. Dubberke, Milwaukee Gas Light Co.; Jeanette Campbell, Ann Ertresvaag, Geraldine Lapping, Dorothy Heick, Ethel Myran, Lucile Werner, and Florence Cotharin, all of Minneapolis Gas Light Co.

Among the reports presented at the conference were those of president Dushane and secretary Searing. Lester J. Eck brought the report about activities of the Technical Section of the A.G.A. and W. E. Derwent brought the report of the nominating committee. The annual banquet and entertainment was held on the second evening of the conference. The family breakfast was held the morning of the same day.

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Appalachian Association

Members of the Appalachian Geological Association with headquarters in Charleston, W. Va., held a joint meeting with the Engineers Society of Western Pennsylvania in Hotel William Penn, Pittsburgh, on March 21, 1941.

At a technical session jointly presided over by Gordon Gully, chairman of the oil and gas section of the Engineers Society, and J. R. Lockett, president of the Appalachian Geological Society, Dr. Richard E. Sherrill of the University of Pittsburgh presented a paper on stratigraphic oil traps in Northwestern Pennsylvania. Members in attendance regarded this paper, the result of several years of research by the Pennsylvania State Geological Survey, as the most complete paper ever delivered before a technical group in this section on the subject of stratigraphic traps.

K. C. Cottingham, chief geologist of the Ohio Fuel Gas Co., with headquarters in Columbus, Ohio, gave a paper entitled "Some Fundamentals in Gas Production," in which he discussed from the practical standpoint many of the problems relating to measurement, transportation and control of natural gas.

Mr. E. T. Heck of the West Virginia Geological Survey discussed "Acidizing of Old Producing Gas Wells," and gave statistics on production after the wells had been treated by the acidizing process, showing the great possibilities of increasing the production by treating certain types of old producing gas wells by this process.

In the evening visiting members of both societies attended a dinner-dance in Hotel William Penn. Saturday morning J. V. Goodman of the Equitable Gas Co., Geological Department, conducted a group on an inspection trip covering some of the company's storage pools and explained how these depleted gas fields are now being used for gas storage reservoirs for the purpose of augmenting the available gas supply during the peak load demands of the winter months.

Virgil Bowyer of the Peoples Natural Gas Co. was in charge of arrangements for the meeting.

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P.C.G.A. Northwest Meeting

Plans for the Northwest Conference of the Pacific Coast Gas Association at Portland, Ore., are being prepared by president R. A. Hornby, president of the Association, and R. G. Barnett, vice president and general manager of the Portland Gas & Coke Co., chairman of the program committee.

The meetings will be held June 9 and 10 in the auditorium of the Public Service Building. The conference will open at 2:30 on Monday afternoon, June 9, in order to accomodate delegates from the South who will arrive on the Cascade on that date. Another session is planned for the evening. Two sessions will be held on Tuesday, June 10, and a conference luncheon will be served on that day.

The dates were chosen in order to permit delegates to take part in the colorful Portland Rose Festival which opens on Wednesday, June 11.

An imposing roster of prominent speakers identified with the Gas Industry has been arranged for the meetings. They include: Paul B. McKee, president of the Portland Gas and Coke Co.; R. A. Hornby, president of the Pacific Coast Gas Association; W. E. Derwent, vice president of the George D. Roper Corp. and president of the Association of Gas Appliance and Equipment Manufacturers; R. E. Fisher, vice president of the Pacific Gas and Electric Co.; George S. Jones, general sales manager of Servel, Inc.; N. R. McKee, vice president of the Southern Counties Gas Co.; O. R. Dorr, general sales manager of Pacific Gas and Electric Co., and W. M. Jacobs, superintendent of sales of Southern California Gas Co.

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CALENDAR

May

A.G.A. Convention, Natural Gas Section—Dallas, Texas, May 5-8.

Mid-West Industrial Gas Sales Council Spring Meeting—Fort Armstrong Hotel, Rock Island, Ill., May 8-9.

National Metal Trades Association—Palmer House, Chicago, Ill., May 8-9.

Indiana Gas Association—French Lick Springs Hotel, French Lick, Ind., May 12 and 13.

Pennsylvania Gas Association—Skytop, Pa., May 12-14.

A.G.A. Production and Chemical Conference—New York, N. Y., May 19-21.

Western Metal Congress and Exposition—Biltmore Hotel, Los Angeles, Calif., May 19-23.

Canadian Gas Association—Hamilton, Ontario, May 20-21.

Natural Gas and Petroleum Association of Canada—Hamilton, Ontario, May 22-23.

June

Association of Gas Appliance and Equipment Manufacturers—Ambassador Hotel, Los Angeles, Calif., June 3-5.

Pacific Coast Gas Association Northwest Conference—Portland, Ore., June 9 and 10.

L.P.G.A. Pacific Coast Section—San Francisco, Calif., June 9 and 10.

Pacific Heating and Air Conditioning Exposition—San Francisco, Calif., June 16-20.

Michigan Gas Association—Grand Hotel, Mackinac Island, Mich., June 30, July 1 and 2.

August

Appalachian Gas Measurement Short Course—Campus, University of West Virginia August 18-20.

September

Mid-West Gas School and Conference—Ames, Iowa, September 8-10.

Annual Convention, Pacific Coast Gas Association—Del Monte, Calif., September 10-12.

Empire State Gas and Electric Association—Saranac Inn, Saranac, N. Y., September 11-12.

October

23rd Annual Convention, American Gas Association—Atlantic City, N. J., the week of October 20, 1941.

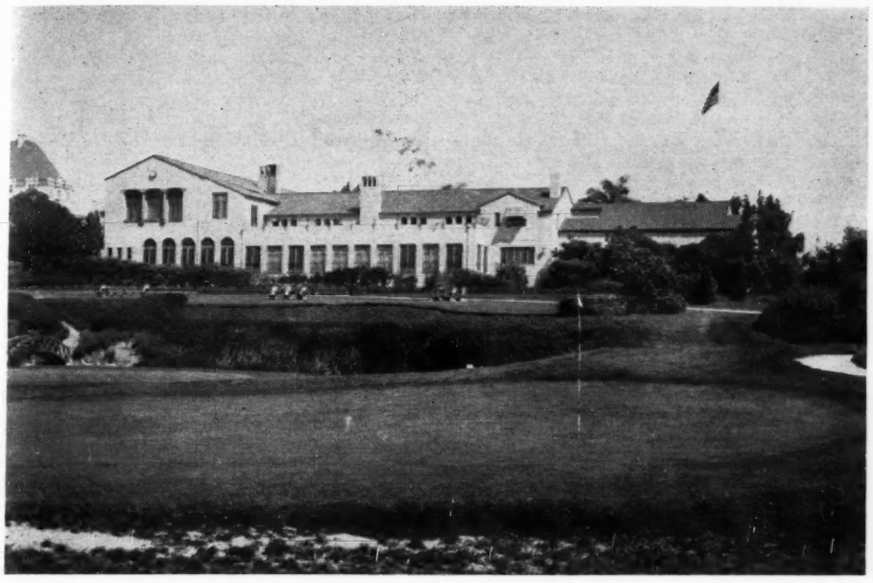
West Virginia Meter School

A. F. Kraus, chairman for the Fourth Annual Appalachian Gas Measurement Short Course called a meeting of the General Committee in Morgantown, W. Va., recently for the purpose of making plans and appointing committee members for this year's meeting. It was decided that sessions would be held on the West Virginia campus August 18, 19 and 20, 1941.

R. O. Borden as chairman of the Rules Committee presented a revised organization plan for the school which was approved and adopted. Under the new by-laws, an Executive Committee was created to conduct the affairs of the school during the vacation of the general committee and to appoint the membership of the general committee in accordance to a fixed plan of employment distribution.

The Executive Committee selected is as follows:—Three Year Term; G. R. Spindler, West Virginia University, chairman; A. F. Kraus, Peoples Natural Gas Co., and R. W. Hitchman, United Fuel Gas Co. Two Year Term; Stacy Jones, South Penn Natural Gas Co.; J. E. Overbeck, Columbian Engineering Corp., and Lawrence Hunter, Columbian Carbon Co. One Year Term; G. W. Harr, Monongahela West Penn Public Service Co.; Joseph M. Low, Hope Natural Gas Co., and T. K. Spalding, Owens-Libby-Owens Co.

Sub-committees were also appointed to formulate plans and administer the affairs of the 1941 school. These include: Program Committee, J. F. Overbeck, Columbian Engineering Corp., chairman; Housing and Registration, W. A. Staab, West Virginia University, chairman; Banquet and Entertainment, A. D. MacLean, Pittsburgh Equitable Meter Co., chairman; Exhibits, J. W. Allison, Monongahela West Penn Public Service Co., chairman; Publications and Merit Awards, G. R. Spindler, West Virginia University, chairman; Publicity, R. S. Reed, Jr., Pittsburgh Equitable Meter Co., chairman; Educational, H. J. Wagner, West Virginia Public Service Commission, chairman; Practical Methods, C. B. Heist, Manufacturers Light and Heat Co., chairman.



The Wilshire Country Club golf course in Los Angeles, Calif., scene of the golf tournament to be held by the A.G.A.E.M. as a feature of their meeting June 3-5.

A.G.A.E.M. June Meeting

Members of the Association of Gas Appliance and Equipment Manufacturers this month are looking forward to the Association's annual meeting to be held at the Ambassador Hotel in Los Angeles, June 3-5. The program committee, headed by R. G. Logue, vice president of the Ward Heater Co., has scheduled a series of events that will combine business and pleasure, and still allow time for the delegates to enjoy the many entertainment spots and points of interest that Southern California offers.

The General Sessions program, which will open at 10 a.m. on June 4, and will be presided over by W. E. Derwent, president of the A.G.A.E.M., offers the following speakers:

Mayor Fletcher Bowron—Address of Welcome.

W. E. Derwent will then present his report on the activities of the Association during the past year.

R. A. Hornby, president, Pacific Coast Gas Association, and vice president, Pacific Lighting Corp.—"Will your sales policies be war fatalities?"

Wayne Smith, general chairman of the Manufacturers Section of the P.C.G.A. will extend a greeting from the Western manufacturers to the visiting Eastern members.

G. H. Green, president of the National Retail Hardware Association—"Are We Overlooking An Opportunity?"

C. E. "Deke" Houlgate, representative of the American Gas Association (for the motion picture industry)—"Gas, Glamour and Gimme."

The balance of the general session will consist of the report of the nominating committee, election of officers, and other business.

To turn to the entertainment side of the program, the delegates will be taken on a trip to Catalina Island. This trip to the world famous Isle, 30 miles off the coast of Southern California, will be sponsored jointly by Southern California Gas Co., Southern Counties Gas Co., the A.G.A.E.M., and the Manufacturers Section of the P.C.G.A.

Featured event of Thursday, June 5, will be the golf tournament to be held at the Wilshire Country Club, one of the most exclusive clubs in Los Angeles, which is conveniently located within 10 minutes of convention headquarters at the Ambassador.

The golf course will be available for registered guests to play any time during the week of June 2nd. The course at Wilshire has a professional rating and has been the scene of three such events during recent years.

Olin Dutra is the pro at Wilshire. Many will remember Olin as the winner of the U. S. Open in 1934 and in 1932 as the winner of the National Professional Golf Association tournament.

The players will find the Wilshire course more than interesting, particularly the 440 yard 18th hole, which has been included by the American Golf Association in their hypothetical All-American golf course.

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C.N.G.A. June Meeting

Under chairmanship of H. E. Leedy of the Crane Co., the committee in charge of the program for the 1941 June Frolic of the California Natural Gasoline Association announces the event will be held at the Riviera Country Club, Santa Monica, Calif., Saturday, June 7.

This annual sports-fun fiesta will find the daytime devoted to a sports program with the first of the golfers teeing off at 8:30 A.M., a program of diversified sports events during the afternoon featuring a baseball game between the Majors and Independents, volley ball, horseshoes and badminton. Refreshments will be without charge during the day. The evening program will feature a banquet to be followed by a specially arranged show.

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N.E.G.A. Operating Division

The Operating Division of The New England Gas Association will hold their meeting at the Hotel Bancroft, Worcester, Mass., on May 7. The meeting will feature a morning demonstration of methods of extinguishing oil fires by water fogging, presented by the Rockwood Sprinkler Co., of that city.

Discussion Conferences will be held in the

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afternoon, under the topics of Production, with Herbert C. Jones, New England Power Service Co., chairman; Distribution and Utilization, under the chairmanship of T. F. Smith, Boston Consolidated Gas Co.; and Meters, headed by George A. Palmer, New England Power Service Co.

The evening session will feature three addresses; "The Use of Filters for Reducing Service Costs," by H. D. Lehman, Philadelphia Gas Works Co.; "The Use of Gas as a Chemical Agent," by C. George Segeler, American Gas Association; and "Some New Facts on Liquid-Phase Gum," by Dr. T. A. Mighill, Blackstone Valley Gas and Electric Co.

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California Meter Association

The Southern California Meter Association held its monthly meeting recently on April 17. The featured address was presented by J. B. Reddick of the Southern California Gas Co. under the title, "The Friction Factor in Pipe Line Flow." In addition, a local member of the F. B. I. presented an instructive and interesting talk, "General Function and Operation of the Federal Bureau of Investigation."

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Canadian Gas Association

The 34th Annual Convention of the Canadian Gas Association is scheduled to be held in the Royal Connaught Hotel, Hamilton, Canada, on Tuesday and Wednesday, May 20 and 21. This meeting will be directly followed by the 18th Annual Convention of the Natural Gas and Petroleum Association, under the leadership of Major E. Sweet, K.C., president of the Association, which will be held on May 22 and 23, also in the Royal Connaught.

The Gas Association meeting, conducted by J. B. McNary, president, will feature addresses by the following: John Keiller, Gas engineer, B. C. Electric Ry., Co.; A. J. Strain, Consumers' Gas Co.; M. J. Gardner, Montreal Light, Heat and Power Consolidated; A. E. Lee, Servel Inc.. H. P. Nagel, Dominion Natural Gas Co., Ltd.; and Jessie McQueen, Home Service counsellor, American Gas Association.

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Pacific Coast L.P.G.A.

Plans for the second annual convention and exposition of the Pacific Coast Section, Liquefied Petroleum Gas Association, on Monday and Tuesday, June 9-10, in the Fairmont Hotel, San Francisco, Calif., are now complete, according to the announcement of Charles E. McCartney, chairman of the Pacific Coast Section.

Monday and Tuesday morning will be given over exclusively to tours of the exposition and its exhibits. The Monday afternoon program will consist of an address of welcome by Charles E. McCartney; an address by an executive officer, L.P.G.A., and three papers. One of these will be "Sell the Bloom of the Rose, Not the Seed," by E. C. Sorby, promotion director, Geo. D. Roper Corp., Rockford, Ill. This will be especially prepared for dealers in fuel and domestic appliances, and will include cooking a meal during delivery of the paper. Facts and figures on relative cost of LP-Gas and competitive fuels will be presented.

C. L. Parkhill, vice president, Parkhill-Wade, Los Angeles, will present an illustrated paper titled, "A Survey of the LP-Gas Internal Combustion Engine Market." The final paper on the program will be a joint presentation by Max Anfenger, safety engineer, and Dr. O. W. Johnson, both of Standard Oil Co. of California, titled "Physical Properties of LP-Gases," a repeat-by-request paper from the meeting in Fresno, Calif., last October.

Monday evening will be for feast and fun at the usual banquet. The entertainment will be called the "Frisco Frolic," and will present headliners of stage and radio.

The entire program for Tuesday afternoon will be devoted to an LP-Gas safety and fire demonstration.

Special transportation arrangements have been made for those attending from outside California. Special L.P.G.A. cars will be attached to fast trains to San Francisco from points in Washington, Oregon, Nevada and Arizona. Likewise, members attending from the East and Midwest will gather in Chicago and travel to San Francisco as a group in special L.P.G.A. cars while those attending from the South and Southwest, will meet in New Orleans and at points en route and travel in a body.

Those desiring detailed information concerning exhibits in the 60 booths, the contion program, transportation arrangements, etc., may communicate with John H. Kunkel, secretary, 332 Van Nuys Bldg., Los Angeles.

■ ■

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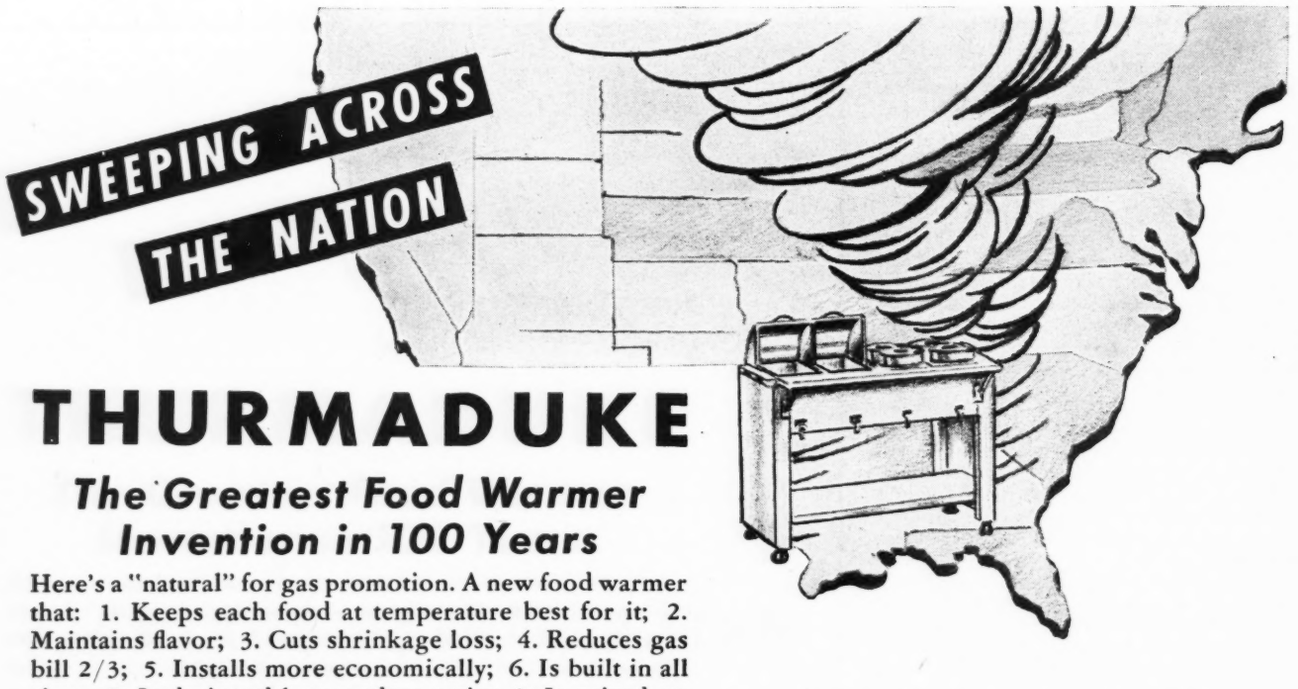

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THURMADUKE IS PROTECTED BY U.S. PATENTS, SO BASICALLY NEW IS ITS PRINCIPLE OF OPERATION.

DUKE MFG. CO. • ST. LOUIS, MO.

Laclede Builds New Meter Shop

AN opportunity which seldom comes to light with the operation of gas distribution companies — that of making the public an interested figure with the improvement of various shops and facilities—was heartily seized upon by Laclede Gas Light Co. of St. Louis, Mo., when the firm recently completed a modern new meter repair shop at Gravois and California avenues in the southern section of the Missouri metropolis.

Operations Publicized

Instead of leaving the greatly-improved facilities for all meter operations to show up merely as better service, the company publicized the new shop and every step of its operations widely—with a newspaper photo series, invitations to customers to attend a "grand opening," and a special folder on the shop for those customers interested in the mechanical end of their gas supply.

Unchanged for more than a decade, the meter shop is now a pleasant-to-the-extreme place in which to work for Laclede's 27 meter shop repairmen, well-lighted, comfortable, and cool through the formerly oppressive summer months, when temperatures formerly reached over the 100° mark. According to Alfred Hirsh of the company "The meter crew can now enjoy the same advantages as customer service men in our main building."

The former incandescent-bulb lighting of the shop has been replaced with modern daylight illumination provided by shielded fluorescent tubes, one within 3 or 4 ft. of every working surface. There are no dim spots in the shop, and the light provided eliminates the heat from old-style 150-watt electric light bulbs.

The shop is heated through the winter months by unit gas heaters, six of which provide warmth for the shop rooms which do not contain heating apparatus for mechanical work. Two million B.t.u. per hour is provided, with three heaters equipped with double louvres, to permit admission of outside air or recirculation as desirable. The shop foreman has the responsibility of keeping the meter shop comfortable, and it is possible for him to exhaust all collected odors within a 15-minute period.

The former wooden benches, which had been used for more than 10 years for all operations, have been replaced by polished steel work tables, which permit extreme cleanliness, reduce fire danger, and can be easily moved as needed. Convenient tool drawers, and a large-capacity locker for each table give each man an individual control over his equipment.

Where foul odors were constant in the meter-cleaning room, the atmosphere is kept pleasant by construction of a galvanized metal exhaust duct over the oakite tank for boiling off meter cases, which carries off odors as quickly as they are released. Immersed heaters are installed in the oakite tank for heating the unit, providing for a smooth temperature under any conditions.

Another improvement for the removal of fumes accumulating in the stripping room is a galvanized metal hood over each stripping bench, with a forced-draft system which whirls released fumes out into the outside air. Prior to this installation, the stripping room had to be partitioned off from the rest of the building. More outside lighting and better breathing conditions are the result of the new system.

On each bench is an individual motor for independent operations, a tight hood over the soldering irons, and a vertical stack for removing flux fumes, and burner heat. Hoods are thickly insulated, and have a sealed air chamber for keeping heat concentrated under the hood, rather than dissipated through the shop.

More Features

More features include heat in the prover room, where Minneapolis-Honeywell thermostats keep temperature within a 2° range for better overnight testing of finished meters (a standard practice now), a humidifying tank for air in provers, providing 100% saturation at all times, and a new all-stainless metal oil-leak test bench where meters can be tested both with air pressure and submergence in water for inside and outside leaks.

In each step, Laclede engineers were motivated by a desire for more comfort for employees, this in turn giving rise to more efficient and larger production of work. The shop has cut time on all operations from 10% to 25%.

Details of improvement in the work benches, now set at right angles to the windows. Fluorescent light, hoods over soldering iron and individual ventilating systems are more improvements.

Today's *big* space heating opportunity

SELL THEM A WARD... MAKE THEM FRIENDS OF GAS FOR LIFE

We build floor furnaces *exclusively*... 62 models, both automatically and manually controlled. There is a Ward Floor Furnace for every type of installation. Automatic models feature *Bilt-in Thermo-Control,* an accurate thermostat that is part of the furnace... *Automatic Safety Pilot,* which shuts off gas flow immediately if flame is extinguished... *Cradle Circulator,* which makes air movements steady and continuous.

The furnace is built of heavy gauge rust-resisting iron. Guaranteed for ten years, it will give a lifetime of heating service.

Ward Floor Furnaces Are A.G.A. Approved

YOUR LOAD IS AS GOOD AS THE APPLIANCE YOU SELL

is in *small* homes

Ward's vented, automatic, circulating warmth will help you win *permanent* heating revenue from these homes

This year are you planning to make the most of your big opportunity in those new and already built small homes where your load is not protected by *permanent,* automatic furnace heat?

The practical way to do it is with the Ward Floor Furnace. Wards deliver completely automatic, circulating warmth at a price that overcomes first cost sales resistance. A Ward doesn't require a basement and, being entirely self-contained, gets around difficult installation problems.

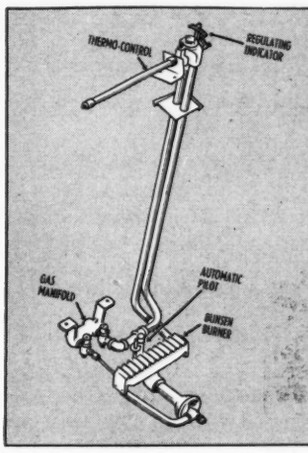
Here's a gas furnace that wins 100% approval from gas companies because it operates *entirely on gas.* No wires. No juice. No electrician.

Wards bring the finest in clean, efficient gas heating within reach of moderate income homes. They've been winning friends for gas for the past 32 years . . . since 1909.

Like to have a look at our catalog?

HERE ARE THE FACTS

This catalog will help you decide the advantages of Ward Floor Furnaces to your merchandising department and as "salesmen" of your gas. Just ask us for a copy and we'll send it along, with our latest price list.



ALL AUTOMATIC FEATURES BUILT IN ...an entirely self-contained furnace

There's a big demand for an entirely self-contained, completely automatic floor furnace so . . . whether or not you carry another line . . . you need Wards. The various parts of Ward's Bilt-in Thermo-Control assembly (pictured here) are hooked up as a complete unit, tested and re-tested at the factory before installation in the furnace. The entire assembly, with its built-in thermostat and controls, goes *inside* the furnace. There are no extra external parts.

THE 1941 *All Gas*

WARD FLOOR FURNACE

WARD HEATER COMPANY, LOS ANGELES

Factory Representatives—A. S. KINCAID, *Southern Manager,* P. O. Box 5, Dallas • J. H. STUBBINS, 300 East 68th Terrace, Kansas City, Mo. H. C. SANDERSON, 207 Fulton Bldg., Pittsburgh • L. E. KIRKPATRICK, 1700 15th St., Denver, Colo. • LEON M. TAYLOR, 3200 Main St., Dallas

SALES Slants

More Kettles Kicked Out

IN this department of our March issue we carried an account of United Gas Corp.'s 1939 and 1940 "Kick Out the Kettle Campaigns," promising ourself to write T. E. Hawkins, manager of United Gas Corp.'s Sales Promotion and Advertising Division, for further information on the 1941 campaign recently completed. Mr. Hawkins has responded with the following facts, for which we extend him our thanks:

United Gas Corp.'s Third Annual "Kick Out the Kettle" Campaign of all-service selling, featuring the sale of automatic storage water heating service, accomplished new gains for the company from the standpoint of its dealer coordination sales program.

For three years now, the company has conducted this winter water heating campaign, each time tying in with its plumber-dealer allies in an effort to achieve the maximum of increased gas use for water heating. This year, the campaign was directed particularly to the sale of automatic water heating to residential and commercial customers who had no water heater whatever, or who had a water heater using a fuel other than gas.

As a single campaign, the results of this Third Annual "Kick Out the Kettle" Campaign were impressive. A total of 3063 "new-use" water heaters were sold, of which 2909 were to residential customers, and 154 (including sterilizers) to commercial customers. Of the total of 3063, 2092 sales were to old customers, which brought them to a use of gas for water heating for the first time in their present locations. Nine hundred seventy-one automatic storage water heaters were sold to customers in new construction.

An analysis of the campaign as compared to preceding "Kick Out the Kettle" campaigns, and to the 1938 campaign prior to the launching of the "Kick Out the Kettle" theme, is interesting. In the table below is shown how the percentage of dealer sales, compared to company sales, in the combined programs has varied.

	% 1938	*% 1939*	*% 1940*	*% 1941*
Company . . .	10	25	10	12
Dealer	90	75	90	88

One of the most accurate measures of success in a campaign of this type is a comparison of the sale of "new-use" and replacement installations. The following table illustrates this point:

	1938	*1939*	*1940*	*1941*
New use . . .	952	1954	1523	3063
Replacement .	510	533	675	613
Total	1462	2487	2198	3676

Increases in total sales are, perhaps, the best index of the value of a selling method. A glance at the over-all totals in the table above shows the 1941 sales of "new-use" and replacement water heaters were more than two and one-half times what they were in 1938, and one-third larger than in 1940.

The Company was aiming, however, at a more specific end—the increase of new gas use through water heating under a program of co-ordinated dealer-company selling. Again, the figures tell the story. Following the "new-use" line across, it becomes apparent that "new-use" sales in 1941 were nearly three and one-half times as great as in 1938, when the emphasis was not so sharply placed on new use and before the coordinated dealer-company selling program had reached full swing.

Whatever the Company's future policies may become, it is quite certain, from the present outlook, that one of them will be encouragement of dealer coordination in the sale of "new-use" water heating.

■ ■

California Cooks Classified

The gas companies in Southern California are especially adept at dreaming up cooking schools for assorted classifications of individuals. Their latest effort was a cooking contest for men only, which was staged at Barker Bros. in Los Angeles on March 19. Forty contestants, with dishes ranging in scope and variety from sour dough biscuits to Paella a la Vallenciana, did their stuff on a bank of gas ranges set up in Barker Bros. model kitchen.

Gentlemen of the A.G.A. Natural Gas Convention

Have you seen the New 1941 Peerless Gas Heating Equipment lines? Truly an array of outstanding equipment to choose from.

PEERLESS CIRCULATORS

A Complete Line

Vented
Unvented

•

SIZES:
20,000 B.t.u.
to
60,000 B.t.u.

With Radiants
Without Radiants

•

New Models
Have Chrome
Trim

No. 7741-C Circulator

Place your orders now. Early orders will assure delivery. You get many Exclusive Features in Peerless Circulators.

PEERLESS MANUFACTURING CORPORATION
INCORPORATED
LOUISVILLE **KENTUCKY**

When the water reaches an excessive temperature

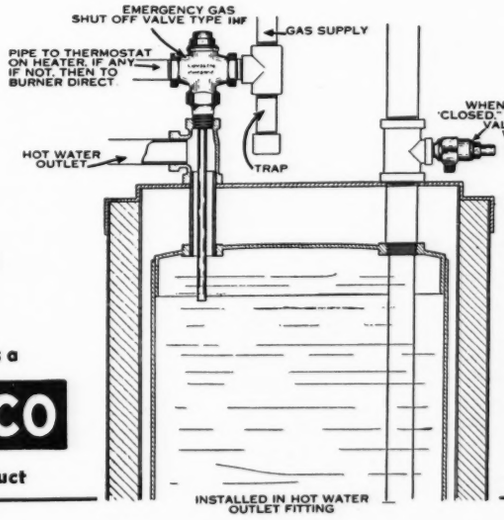
IT SHUTS OFF THE GAS!

"Defender" Valve Type IHF

The KITSON "Defender" is designed to do this — in fact, anticipates it by completely shutting off the main gas supply just below the danger point.

This valve offers *complete insurance* against the consequences of "sticky" thermostats because *it shuts off the main gas supply before any physical damage can be done, and keeps it shut off until the cause of the thermostat trouble can be investigated and removed.*

Thus, positive protection is assured against the stress on tanks, flooded basements and other dire consequences possible in an over-heated domestic water system.


EMERGENCY GAS SHUT OFF VALVE TYPE IHF
GAS SUPPLY
PIPE TO THERMOSTAT ON HEATER, IF ANY IF NOT, THEN TO BURNER DIRECT
WHEN SYSTEM IS "CLOSED," USE AN "EP" VALVE ON COLD WATER INLET ALSO
HOT WATER OUTLET
TRAP
INSTALLED IN HOT WATER OUTLET FITTING

A. G. A. Approved

It's a K-CO Product

PROVE it for yourself. We will be glad to send any gas company a sample of the KITSON "Defender" for examination and test. Be sure to specify the size.

Also ask for Catalog "A" covering the complete line of Kitson gas industry brass fittings.

HOW IT OPERATES

The KITSON "Defender" Emergency Gas Shut-off Valve can be installed at the hot water outlet in direct contact with the heated water at the top of the tank. Note the long stem, insuring that the chemical fuse within is in direct thermal contact with the water in the hottest zone at the top of the tank. Immediately the temperature of the water reaches its safety limit beyond the set shut-off temperature of the thermostat, the chemical fuse melts, and the valve shuts tight, cutting off the main gas supply to the water heater burner. *The real protection therefore is that its puts the finger on a faulty thermostat.*

Simply and quickly the chemical fuse cartridge can be renewed when the thermostat trouble is repaired.

The KITSON "Defender" Emergency Gas Shut-off Valve offers positive and complete protection for automatic water heating. That is why many gas companies specify it as standard equipment.

KITSON COMPANY 1500 Walnut Street, Philadelphia, Pa.

KITSON

EMERGENCY SHUT-OFF

GAS VALVE

• SAFETY CONTROLS for MANUAL and AUTOMATIC WATER HEATERS • QUALITY BRASS GOODS for GAS, WATER and ALL PLUMBING USES.

Since 1897

Shown in the picture, whipping up an angel food cake, is Walter Benjamin, a 76-year oldster, who brought his own egg beater; and the group back of him, watching his efforts, are, left to right, Gladys Price, home economics director of Southern California Gas Co.; Prudence Penny, Los Angeles Examiner home economist; and Mary Counselor, director of Kitchen Round Table at Barker Bros., who acted as judges.

This latest event is just one in a long series. Thinking back, we can remember when the Los Angeles companies gathered together a group of dealer appliance salesmen, dressed them up in white aprons and chef's hats and pitted them one against the other in a baking and broiling demonstration. Cakes by the score were the principal product of this effort.

Another recent gas promotional effort was a children's cooking school open to both boys and girls. Sponsored by Southern California Gas Co. in several suburban centers of the company's central division, the project met with an amazing response on the part of the youngsters. The cooking school consisted of a four-weeks' course which was topped off with a cake baking contest, the climax of which was undoubtedly a great gang of tousel-heads clamoring to "lick the pans."

■ ■

"Smog"

"Smog," we have learned from our correspondent in Pittsburgh, is made up of tiny particles of dirt that become wet with moisture and hang in the air, forming a black fog. The dirt comes from soot and smoke emitting from Pittsburgh's industrial and domestic chimneys and smokestacks.

Needless to state this distasteful substance is something to be eliminated—through the use of gas heat. Most recent event to make Pittsburghers aware of "smogless" gas heat was the opening of "The Pittsburgh Home" in Baldwin Manor. Public thought turned to the advantages of using gas heat in "The Pittsburgh Home" because Barone & Lind tied up its opening and the advantages of gas heat with Pittsburgh's feverish interest in the city's "anti-smog" campaign. Publicity men stressed first the location of the home "above the 'smog' line—in the health spot of Pittsburgh"; and secondly of having an air-filter unit connected to the gas furnace, so that it filled the home with clean, healthful, gas heat.

■ ■

For Commercial Cooks

We were interested to learn of the commercial cooking demonstrations being presented by the Atlanta (Ga.) Gas Light Co., wherein we despatched a letter to that company in an effort to quench our curiosity. We now thank W. H. Ligon, industrial sales manager, for his kind reply to our request and quote him as follows:

"For years gas companies have staged cooking schools for housewives and domestic users of gas. So much good has come from these schools that we decided to try a commercial cooking demonstration for the benefit of our restaurant owners, operators, and chefs.

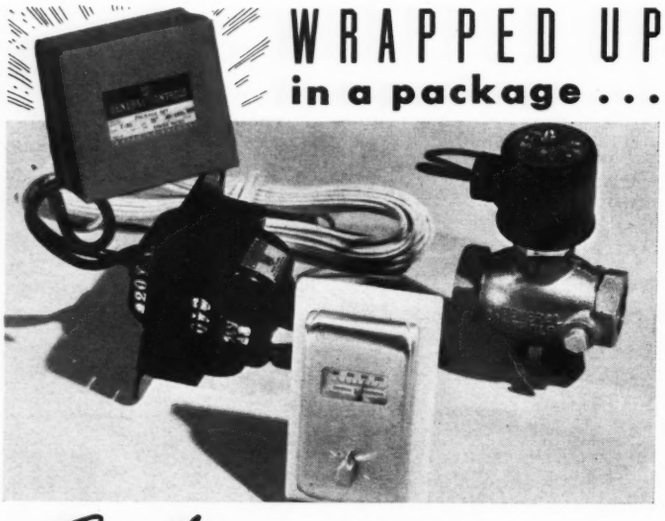
"We have a mailing list of approximately 400 larger hotels, restaurants, and institutions, to whom we sent three mailing pieces, inviting them to attend our cooking demonstration which was held in the afternoon in the Blue Flame Room of the Atlanta Gas Light Co. The total attendance was 156.

"The purpose of this demonstration was to prove to our restaurant customers the value of low temperature roasting. We wanted to show by actual demonstration the savings in meat shrinkage and also to show that low temperature roasting gives juicier, better flavored roasts.

"Before a committee of restaurant owners, two roasts of about the same size were weighed and placed in the oven under chain and padlock; the time, gas meter reading, and temperature setting of heat controls were noted. For convenience a large indicator was placed on the test dial of the meter. Later when the roasts were done the audience witnessed the removal of the roasts as well as the weighing, checking of time, temperature, etc. The shrinkage of each roast was computed on a blackboard. Following are the figures in an actual test:

Fast Roasting		*Slow Roasting*
550 degrees	Temperature	300 degrees
17 lbs. 10½ oz.	Weight Before	16 lbs. 8½ oz.
13 lbs. 8 oz.	Weight After	14 lbs.
4 lbs. 2½ oz.	Difference in Weight	2 lbs. 8½ oz.
12:15 P. M.	Time In	11:15 A. M.
2:00 P. M.	Time Out	2:30 P. M.
23.6%	% Shrinkage	15.3 %

"We found most of our customers were enthusiastic over such a demonstration and learned later that many of them wished they had taken advantage of this opportunity by sending more of their kitchen employees."



WRAPPED UP
in a package . . .

Everything YOU NEED FOR SAFE, SILENT AUTOMATIC CONTROL OF GAS-FIRED BOILERS, WARM AIR FURNACES, ETC.

This General Controls T-30 Gas Heating Package Set is one of the most popular of America's most complete line of automatic gas heating package sets. It includes a humless Type K-3B Gas Valve, the new, handsome T-70-1 Trimtherm, transformer, and 30 feet of wire. Night shut-off and heat anticipation available. Similar sets are available for wall and radiant heaters and gas-fired steam radiators and also for use with butane gas.

WRITE FOR NEW 1941 COMPLETE CATALOG

GENERAL CONTROLS

450 East Ohio Street
Chicago, Illinois

267 Fifth Avenue
New York City

BRANCH OFFICES AND STOCKS IN ALL PRINCIPAL CITIES

SALESMAN WANTED
. . . to tell me more about the Gas Refrigerator. Anxious to replace my noisy old automatic. John Dawson, 1145 South Oaks Avenue, City.

THIS fellow Dawson overdoes things a bit—it's true. But it's also true that gas refrigerator advertising has steamed up a lot of folks to the point where they're glad to have a salesman call and go to work on them.

Surveys prove more and more people every year are turning to Servel Electrolux for its exclusive operating advantages—permanent silence, continued low operating cost, freedom from wear.

Consistent Advertising Policy Pays Dividends

Servel's national advertising has contributed to this trend by sticking to a single, fundamental policy for fourteen years: tell the simple facts about Gas Refrigeration . . . why it's different, why it's better.

Since this policy has been so successful in winning increasing public acceptance, national Gas Refrigerator advertising in 1941 will continue to tell the same story, in a new way: "Servel Stays Silent . . . Lasts Longer—because it freezes with No Moving Parts."

Gas Companies Profit Many Ways

Your Gas Company can take fullest advantage of the opportunity for going ahead with Gas Refrigeration by making sure every member of your community gets this message. Use your local newspaper, outdoor, radio and direct mail advertising to tie in with the national campaign.

Wins good will for gas and gas service

INDUSTRY *Personalities*

• **Thomas R. Weymouth,** vice president of the Columbia Gas and Electric Corp., retired from service on April 1. An outstanding figure in the natural gas industry for many years, Mr. Weymouth was a member of the Natural Gas Association of America since 1911, and, since its merger, a member of the American Gas Association, serving as chairman of the Natural Gas Section in 1938-39.

T. R. WEYMOUTH

Mr. Weymouth has been a leader of organized research activities in the gas industry and has made many contributions of vital importance to the industry's progress. As a member of the Main Technical and Research Committee of the A. G. A. and chairman of the Subcommittee on Gas Measurement, he has made valuable contributions to this group's research program.

He conducted experimental work to determine the deviations from Boyle's Law, carried on research on the extraction of gasoline from natural gas, cooperating with **Col. George A. Burrell** in the development of the process for extraction of gasoline by means of activated charcoal, and contributed largely to the research work on the underground storage of natural gas.

• Secretary of War **Henry Stimson** recently named four more engineers to the special technological committee which is helping the Army draft civilian defense plans. Among those named was **W. Cullen Morris,** vice president of the Consolidated Edison Co. of New York. Mr. Morris was appointed as a representative of the American Gas Association. He is a member of the Association's Committee on National Defense.

• **LeMoyne Dabbs,** for the past two years associated with **Carl Lawrence** in the test laboratory of the Atlanta Gas Light Co., Atlanta, Ga., has joined the Geo. D. Roper Corp. as a sales representative working with District Manager W. L. Plummer out of Atlanta. Mr. Dabbs graduated from Mississippi State College in 1936, and was associated with the Mississippi Public Service Co., engaged in handling industrial and commercial gas sales previous to his association with the Atlanta company.

• **H. H. McMurray** was recently appointed assistant advertising manager of the Washington Gas Light Co., Washington, D. C. He becomes an associate of **Wilmot Squier,** advertising manager. Mr. McMurray has a background of ten years experience as retail salesman, sales floor supervisor and special promotion supervisor. He is a graduate of DePauw and National universities.

• **George L. Roach,** assistant to the president of Servel, Inc., has been appointed general sales manager of the "Evansville Meets the Challenge" program sponsored by the Evansville, Ind., Chamber of Commerce, it has been announced by **F. B. Culley,** general chairman of the movement.

Mr. Roach will aid in recruiting and will direct the 150 or more individuals from the classified business and professional groups who will effect direct contact in the promotion of a greater civic spirit and an expanded Chamber of Commerce program of activities.

• The Hanlon Award, highest honor in the natural gasoline industry and one of the ranking merit awards in the petroleum industry was conferred April 24 on **Alois P. Kremser,** assistant director of research and development, Standard Oil Co. of California, San Francisco, at the Twentieth Annual Convention of the Natural Gasoline Association of America at the Baker Hotel in Dallas, Texas.

Mr. Kremser was the fifth recipient of the Hanlon Award which is conferred each year at this convention for outstanding meritorious service to the natural gasoline industry.

Presentation was made by **George P. Bunn,** Phillips Petroleum Co., president of the Natural Gasoline Association, in the crowded main ballroom of the hotel. The citation of merit read in part: ". . . . To your original formula for analyzing mathematically the operation of the absorption process, we owe much of our present understanding of stripping, rectification and heat transfer, all of which are fundamental elements in the production of natural gasoline and liquefied petroleum gases."

• **A. Earl Wyatt,** Laclede Gas Light Co.'s personnel director, recently was appointed regional director in the National Defense Commission's training-in-industry program. The letter confirming his appointment as a national defense man was signed by **Sidney Hillman,** a labor member of the OPM. Wyatt's services are being lent by Laclede Gas Light Co. to the government.

Mr. Wyatt will head training activities in an area comprising Missouri, Kansas, Oklahoma, Arkansas, and the western part of Tennessee. The first step in organizing the defense training-within-industry will be to select a committee of advisers, two union and two management representatives, to work with Wyatt. In addition, a panel of federal agency heads and personnel men will be formed to help plan the program.

• **W. A. Hudson,** former general manager and head of the homeheating and appliance sales division of the Laclede Gas Light Co. of St. Louis, resigned his position effective April 1, according to an announcement by **L. Wade Childress,** president of the board of directors of the company.

Mr. Hudson was appointed househeating supervisor in charge of domestic gas burner

WILLIAMS BROTHERS CORP.

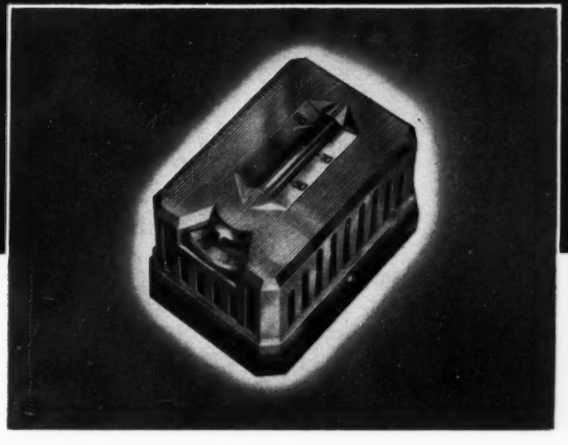
PIPE LINE CONTRACTORS

OIL - GAS - GASOLINE - WATER

Also Heavy Construction

CHICAGO • TULSA • HOUSTON

The Right Combination FOR *Better heater control*



A KLIXON ELECTRIC DIAPHRAGM GAS VALVE and a Klixon snap-acting Thermostat make a perfect pair for controlling gas heaters. The valve is as quiet as a mouse—no noise, no humming, no chattering, no sticking. Because it contains no solenoids. It is thermally operated by a simple, foolproof and scientifically calibrated thermostatic disc.

You can have Klixon Gas Valves with "Puff Bleed"—standard—or "Constant Bleed" at no extra cost. And a simplified arrangement for manual opening with automatic recycling upon power resumption is available at slight extra cost.

Klixon Room Thermostats—also operated by the Spencer Disc—are simple, sensitive and dependable. They contain no delicate or exposed live parts. They are vibration-proof and non-radio-interfering. They insure close control at all times. Can be used for heating, cooling or both.

Klixon Gas Valves come in sizes ranging from ⅜" through 1¼" I. P. S. with 1000 cu. ft. top capacity Current consumption is only 5 watts when open. Valves are available for all types of gas and all types of heaters.

Room Thermostats are available with deluxe cases—in gold, chrome, ivory or walnut finish—with or without Thermometer or in art brown cases without thermometer and with "Hi-Low" numbered adjusting dial.

Valves and thermostats sold separately or in complete packaged sets.

Other Klixon gas controls available. Send for catalog.

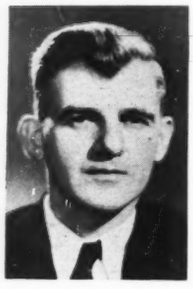
KLIXON

TRADE MARK REG U S PAT. OFF.

SPENCER THERMOSTAT COMPANY • 804 FOREST STREET, ATTLEBORO, MASSACHUSETTS

conversions and gas heating furnace sales on October 10, 1939, where he remained until May, 1940, when he was advanced to salesmanager in charge of general appliance and heating sales. He also conducted salesmanagement exhbiitions and cooperative promotions with St. Louis heating and catering firms. **R. J. Vandergriff** has been appointed to take his place. Mr. Hudson did not announce plans for the future.

• The Gas Appliance Society of California and the Electric Appliance Society of Northern California have jointly announced the appointment of **Richard W. Hurff**, of San Francisco, as new managing director of both organizations. An expanded program of activities will be launched immediately throughout northern and central California.



R. W. HURFF

A statement issued by **Louis J. Breuner,** state president of the Gas Appliance Society, and **Harry A. Saxe, Jr.,** state president of the Electric Appliance Society, announces that this program will include the following:

"Improve Unit operations to make them more valuable to Unit members, the trade and state societies; guide Society campaigns to make them more representative, more productive and more profitable for all; coordinate suggestions of members for expanding and strengthening the activities of the societies; and further cooperative relationships, which have been mutually beneficial, among manufacturers, distributors, retailers and utilities." Mr. Hurff has for the past eight years been associated with the sales department of the San Francisco Division of the Pacific Gas & Electric Co.

• The promotion of **Fred R. Schroeder** of Shreveport, La., to the position of superintendent of the Geological department has been announced by officials of Union Producing Co., an associated company of United Gas Pipe Line Co.

Mr. Schroeder, a graduate of the University of Illinois, first started working for Union in 1930 as a geological scout. He worked in this capacity in the East Texas field during its boom years, 1930 through 1934, moving to Shreveport at the end of that time. In 1937 he was transferred to the general offices in Houston, returning to Shreveport in February, 1940, when the general office of United Gas Pipe Line and its associated companies were moved there.

• **Guy W. Wadsworth, Jr.** was elected vice president in charge of employee relations of the Southern California Gas Co., Los Angeles, Calif., at a meeting of directors, following the annual stockholders' meeting April 16. Mr. Wadsworth and **E. N. Simmons,** controller of the company, were elected to the board of directors at the annual meeting, filling two vacancies on the board. This announcement was made by **F. S. Wade,** president. Other officers and directors were re-elected.

Mr. Wadsworth, personnel manager of this company and the Southern Counties Gas Co., has been identified with the gas industry in Southern California since 1921, when he was employed by Southern Counties Gas Co. in the orifice meter department. He was secretary to the vice president and general manager for about five years, and in 1927 left the company's employ to become assistant financial adviser to the Republic of Haiti under the auspices of the American State Department. He returned to Los Angeles in 1930 to take up personnel work with the Southern Counties Gas Co., and in the fall of 1936 took over the personnel work of the former Los Angeles Gas and Electric Corp. In the spring of 1937 he became personnel manager of the Southern Counties Gas Co.

G. W. WADSWORTH

E. N. SIMMONS

Mr. Simmons, controller of the Southern California Gas Co. since 1937, entered the employ of the former Los Angeles Gas and Electric Corp. in 1909 in the auditing department. He became assistant auditor in 1922 and general auditor in 1925.

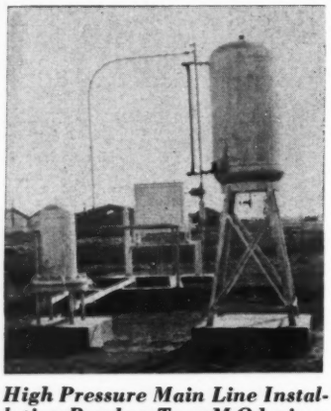
Mr. Simmons has been active in accounting sections of the American Gas Association and Pacific Coast Gas Association, and is a member of the management committee of the accounting section of the A.G.A., and past chairman of the accounting section of the P.C.G.A.

• A farewell luncheon was recently tendered to **Winfield B. Carson,** who is retiring from active service as secretary of the Philadelphia Co. and its subsidiary companies after more than 42 years of continuous service. He was employed on July 1, 1898, as secretary to the president of the Consolidated Gas Co. of the city of Pittsburgh. Mr. Carson was elected secretary of the Philadelphia Co. and the Equitable Gas Co. in 1901, and subsequently secretary of the other associated companies. He also served as vice president of companies subsidiary to the Philadelphia Co. for a number of years.

At the luncheon, **E. W. Washabaugh,** assistant secretary, acted as toastmaster. Mr. Carson was presented with a watch suitably engraved as a token of appreciation of his associates' many pleasant years with him and for his utmost consideration of the welfare of his subordinates.

• **R. E. Easton,** president of the Santa Maria Gas Co., Santa Maria, Calif., was elected a director of the Southern Counties Gas Co., Los Angeles, at the annual meeting of the board of directors held recently. He succeeds **Fred Champion,** who retires from the board. All other officers and directors were re-elected.

• It was recently announced that **H. M. Freet,** heating engineer in charge of the sales and service of gas heating and air conditioning appliances division of the West Ohio Gas Co., Lima, Ohio, for the past 15 years, has been promoted to a position as district manager in charge of offices at Wapakoneta, St. Marys and Celina, Ohio. Mr. Freet will succeed **William S. O'Brien,** who has held the position for 14 years.



High Pressure Main Line Installation Peerless Type M Odorizer

ODORIZING

with proven

Accuracy

Economy

Dependability

See This Modern Odorizer in Operation at the

NATURAL GAS CONVENTION
Dallas . . . May 5-6-7-8

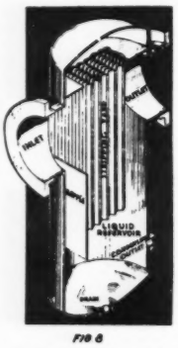
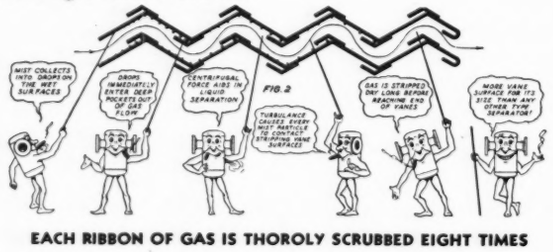


FIG 6
Cut-away section showing arrangement of vanes
U. S. Patent No. 1,988,706

And also see the Well Line Drips, Well Separators, and Mist Extracting Units for Plant Scrubbers and Absorbers. No liquid can pass through these vanes.


MIST COLLECTS INTO DROPLETS ON THE WET SURFACES
DROPS IMMEDIATELY ENTER DEEP POCKETS OUT OF GAS FLOW
CENTRIFUGAL FORCE AIDS IN LIQUID SEPARATION
FIG. 2
TURBULANCE CAUSES EVERY MIST PARTICLE TO CONTACT STRIKING VANE SURFACES
GAS IS STRIPPED DRY LONG BEFORE REACHING END OF VANES
MORE VANE SURFACE FOR ITS SIZE THAN ANY OTHER TYPE SEPARATOR!

EACH RIBBON OF GAS IS THOROLY SCRUBBED EIGHT TIMES

PEERLESS MANUFACTURING CO.

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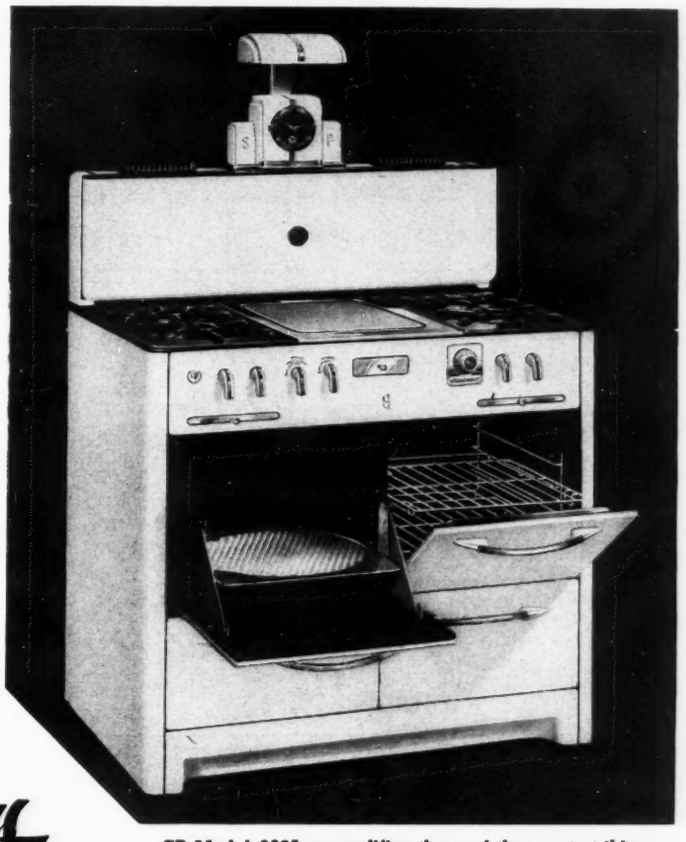
WEDGEWOOD *Gas Ranges*

INCLUDE

HIGH SPEED
LOW TEMPERATURE
OVEN BURNERS

another outstanding ★ WEDGEWOOD feature



CP Model 6385 exemplifies three of the most striking developments in modern gas range design — High Broiler — Top Griddle — Divided Top.

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WEDGEWOOD Gas Ranges Gain New Friends for Gas

Provides Many Advantages

★ True low-temperature cooking at 250°

★ Eliminates shrinkage—saves food

★ Fast oven preheating at low fuel cost

★ Oven lights itself when control is set

WEDGEWOOD'S extra heavy spun glass fuel-saving insulation keeps kitchens cool in summer.

WEDGEWOOD

THE MODERN GAS RANGE

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Obituaries

Kay C. Krick

Kay C. Krick, age 71, former general contracting agent for the Logan Gas Co. and its successor, the Ohio Fuel Gas Co., prior to his retirement in 1931, died recently at his home in Columbus, Ohio.

During his active business life in Columbus, Mr. Krick was vice president and director of the Logan Gas Co., the Preston Oil Co. and the Ohio Fuel Gas Co.; director of the Citizens Trust and Savings Bank and its successor, the Ohio National Bank. He was a charter member and had served as director, vice president and president of the Natural Gas Association of America; was a member of the American Gas Association, co-organizer and director of the Ohio Gas Association and its successor, the Ohio Gas and Oil Men's Association; a member of the West Virginia Gas Association and of the American Petroleum Institute.

■ ■

Henry S. Battin

Henry S. Battin, who had been an executive of the United Gas Improvement Co., Philadelphia, Pa., for many years, died recently in Miami, Fla. He was 80 years of age, having retired from active service in 1929. At the time of his retirement he was executive assistant to the general superintendent of U. G. I., having started with that company in 1898.

Mr. Battin came from a family that had been identified continuously with the gas industry since 1844. His grandfather, Joseph Battin, built the Albany (New York) Gas Works during that year, being at the time one of the few builders of gas works in the United States. Joseph Battin also built the gas works at Syracuse, N. Y.; Charlestown, S. C.; Paterson, N. J.; Elizabeth, N. J., and Scranton, Pa.

Mr. Battin's father was superintendent of the Scranton Gas and Water Co. for a number of years, and Mr. Battin's first work in the gas business was with that company. From there he went to Chicago in 1883, where at that time they had one of the largest carburetted water gas plants in the country. He went to U. G. I. directly from Chicago in 1898.

■ ■

Frank L. Chase

F. L. CHASE

Frank L. Chase, vice president and general manager of the Lone Star Gas Co., Dallas, Texas, died recently fo a heart attack which he suffered on a train just outside of Memphis, Tenn.. Formerly with the Ohio Fuel Gas Co., Mr. Chase had been the president and chairman of the Natural Gas Section, American Gas Association, and was very active in the National Petroleum Institute. At one time he was connected with the Central Contract & Finance Co., a pipe line company.

■ ■

John Barneson

Capt. John Barneson, one of the most colorful figures in the California oil industry, passed away at his home in Burlingame on February 25.

At the time of his retirement, for ill health, about 13 years ago, Capt. Barneson was president of the General Petroleum Co. He built the first oil pipe line from Coalinga to Monterey and then began an organization which evolved in 1912 into the General Petroleum Company, which he headed until his retirement.

■ ■

George W. Ratcliffe

George W. Ratcliffe, retired president of the Manufacturers Light and Heat Co. of Pittsburgh, Pa., and a leader in the natural gas industry for 38 years, died at West Palm Beach, Fla., recently.

He has been active in the affairs of various gas and oil associations, and in 1932-33 was chairman of the Natural Gas section of the American Gas Association.

■ ■

Daniel J. Schoenberger

Daniel J. Schoenberger, 53, vice president of the W. J. Schoenberger Co., of Cleveland, Ohio, died suddenly April 4, at Miami Beach, Fla.

Mr. Schoenberger, a native Clevelander, joined his brother, William J., in the manufacturing business there in 1920. He served overseas with the United States Army in the World War.

The Lattimer-Stevens Company

Stopcocks with Compression Gasket Ends

(Cutaway Section shows depth and assembly)

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HOUSTON, TEXAS

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United Gas Pipe Line Co. Fills Defense Needs

UNITED Gas Pipe Line Co., one of the largest natural gas transmission companies in the world, recently began regular deliveries to a large army camp in the vicinity of Alexandria, La., where gas requirements are approximately the same as those of a city of 30,000 population. At the same time the government and United conferred on gas requirements at other projected camps.

Unusually large demands have not been limited to the army and navy in the case of the United Gas system, although it serves natural gas to naval bases, army and navy air fields and army camps in the Gulf South area which comprises parts of Texas, Louisiana, Mississippi, Alabama and Florida. Many industries engaged in the production of materials and supplies vital to the defense program have been calling for more natural gas.

Boat yards along the Gulf coast, machine plants, refineries, cement and lime companies, the many electric generating plants which rely upon natural gas as a source of energy —and many others have called for increased amounts of natural gas to aid them in meeting defense requirements.

In a recent interview R. H. Hargrove, general manager of United Gas Pipe Line Co., said, "We are proud of the part this area and the natural gas industry is now playing and of the fact that they are prepared to play an even greater part in meeting the demands of our National Defense program."

■ ■

New Remington Plant To Use Natural Gas

The Gas Service Co., Kansas City, Mo., announced recently the signing of a contract with the United States Government for supplying natural gas to the small arms manufacturing plant now being built by the government to be operated by the Remington Arms Co. at Lake City, just east of Independence, Mo.

It will be necessary for the Gas Service Co. to construct approximately nine miles of 8-in. gas main to supply the plant. Work is to be started on the line, to cost approximately $100,000, as soon as possible.

Total annual consumption of gas at the Remington Arms plant is expected to total approximately 600,000,000 cu. ft. The maximum winter day will be about 4,000,000 cu. ft., the maximum month about 68,000,000 cu. ft. and the minimum month about 35 000,000 cu. ft. Gas is to be used for all fuel purposes. Its principal use will be for heating and processing purposes.

■ ■

San Diego, Calif., Company Trains Own Welders

As new welders are needed by the Gas Distribution Department of the San Diego Gas and Electric Co., San Diego, Calif., selected men are given a four-week training course by foreman F. G. H. Elliott. Classes are held in the gas distribution department's tool shed and last all day.

"The majority of our welders," explained Elliott, "are men who have had no previous training. Periodically all of our welders are called in and given proficiency tests, and in addition, samples of each man's welds are taken in the field at least once a month, without previous notice. This company's welding school was established in 1923. Not only are the men trained in actual welding practices; they are also taught the safe handling of all welding tools and apparatus."

Roanoke Gas Co. Wins CP Award

AT the finish of a close race among all the gas companies in the United States and Canada, the Roanoke Gas Co., Roanoke, Va., led by E. V. Bowyer, new business manager, captured the coveted CP Ranger Club National Best Performance Award for the outstanding performance in promoting the sale of CP gas ranges in 1940. Dealer sales played an important part in helping this manufactured gas company make its outstanding record.

For selling the greatest number of CP ranges per 1000 domestic meters in seven divisions and eight regions, 15 gas companies were presented with handsome silver and walnut Victory Trophies by commanding director George L. Scofield .

Winning companies in 1940 were:

Divisional Winners

Division I—Southern California Gas Co., Los Angeles, Calif.

Division II—United Gas Corp., Houston, Texas.

Division III—Michigan Consolidated Gas Co., Grand Rapids, Mich.

Division IV—Central Indiana Gas Co., Muncie, Ind.

Division V—Roanoke Gas Co., Roanoke, Va.

Division VI—Florida Public Utilities Co., West Palm Beach, Fla.

Division VII — Atlanta Gas Light Co., Newnan, Ga.

Regional Winners

Region I—The Bridgeport Gas Light Co., Bridgeport, Conn.

Region II—Republic Light, Heat & Power Co., Buffalo, N. Y.

Region III—Georgia Public Utilities Co., Augusta, Ga.

Region IV—Western United Gas & Electric Co., Aurora, Ill.

Region V—Minneapolis Gas Light Co., Minneapolis, Minn.

Region VI—Public Service Co. of Colorado, Fort Collins Division.

Region VII—Mississippi Public Service Co., Amory, Miss.

Region VIII—Washington Gas & Light Co., Tacoma, Wash.

■ ■

Canadian Repressuring Bill

Authorizing the lieutenant-governor-in-council to grant an exclusive franchise to a corporation to take and dispose of waste gas in Alberta gas and oil fields for the purpose of restoring and maintaining pressure, a bill was reported through committee of the Alberta legislature.

Modern Profitable
UTILITY
Heating Equipment
Uni-Therm forced-air basement and closet furnaces.
Sol-Air floor and dual register furnaces.
Thermaflo forced-air circulating heaters.
From a dependable source of supply.
See our line at Dallas during A.G.A. Convention. Mr. W. V. Fitch in charge Baker Hotel
UTILITY FAN CORPORATION
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CURRENT *Reading*

General

Inventory Control Methods — A report recently issued by the Policyholders Service Bureau of the Metropolitan Life Insurance Co., New York, N. Y. The report is based on data contributed by a number of industrial companies that are believed to have developed sound practices of controlling inventories of supplies, direct materials, and finished goods. It is not intended to cover the control of work-in-process inventories, nor does it apply to the merchandise control policies of retailers and wholesalers.

Petroleum Facts and Figures—The 1941 or seventh edition, published by the American Petroleum Institute. The volume, in its nearly 200 pages, includes the whole range of the petroleum industry. The new edition of this reference book follows previous editions in form, but contains dozens of new tables and brings up to date, with many 1940 figures, practically all tables from 1937 and 1939 editions.

Accident Facts — The Preliminary 1941 Edition of the National Safety Council's annual statistical yearbook. It is sent to you in response to the demand for prompt, though incomplete, information on 1940 accident totals. The regular edition, containing analysis of every phase of the accident situation will be off the press as usual in June.

Dangers and Health Hazards of Fire Gases—By Harold Joe Davis, B. Sc., Safety Engineer, 3927 East Admiral Place, Tulsa, Okla. This booklet includes comments on Action and Behavior of Fires, Reactions of Materials Under Fire Conditions, Materials Capable of Producing Lethal Fire Gases, Gas-Sampling Apparatus, Laboratory and Field Tests for New Materials, Reactions of Combined Fire Gases, Postponed Collapse from Fire Gases, Two-Fold Dangers of Fire Gases and Materials, Chemicals and Gases That Are Dangerous to Life Under Fire Conditions.

The Petroleum Industry — An economic survey; by Roland B. Schuman, 297 pages, cloth, charts and tables; published by University of Oklahoma Press, Norman, Okla. $3.00. An examination of present-day aspects of the petroleum industry, written by the head of the University of Oklahoma's Department of Business Management in an effort to interpret the problems and the spirit of the American petroleum industry for the lay reader. His approach is practical and interpretative.

My Country 'Tis of Thee—The Use and Abuse of Natural Resources, by Lucy Sprague Mitchell, Eleanor Bowman, and Mary Phelps, 335 pages, cloth, maps, charts, line drawings and half-tones; published by The MacMillan Co., New York, N. Y.; $3.50. An approach to the problem of reputedly dwindling natural resources—soil, coal and oil, based upon the study, thoughts, and feelings of three educators who have travelled and seen for themselves. After due process of thought they reach the conclusion that conservation lies in "national planning" and "democratic collectivism."

Lifelines of the Axis Oil Supplies — a map, 20 by 20 in., published by Petroleum Press Bureau, 91/93 Bishopsgate, London, E. C.2., England; 2.6d. postpaid (about 52c). Specially prepared map illustrating the principal routes along which the Axis Powers draw their oil supplies, with location of more important European oil fields, refineries, and coal-oil plants.

Public Relations — A summary of Lectures and Discussions is being published of the short course, conducted by the American Council of Public Relations held in New York in January. This volume will contain the views of the thirty-one prominent leaders of current public relations problems. The number of copies will be listed by the number of advance orders received. The volumes will cover Consumer Relations, Public Opinion and Propaganda, Government Relations, Industrial Relations, Principles, Practices and Procedures sections. The price is $5.00 and orders can be placed with American Council of Public Relations, 365 Guinda St., Palo Alto, Calif.

Elements of the Petroleum Industry—519 pages, charts, tables, line-drawings; published by American Institute of Mining and Metallurgical Engineers, 29 W. 39th St., New York, N. Y.; $5.00.

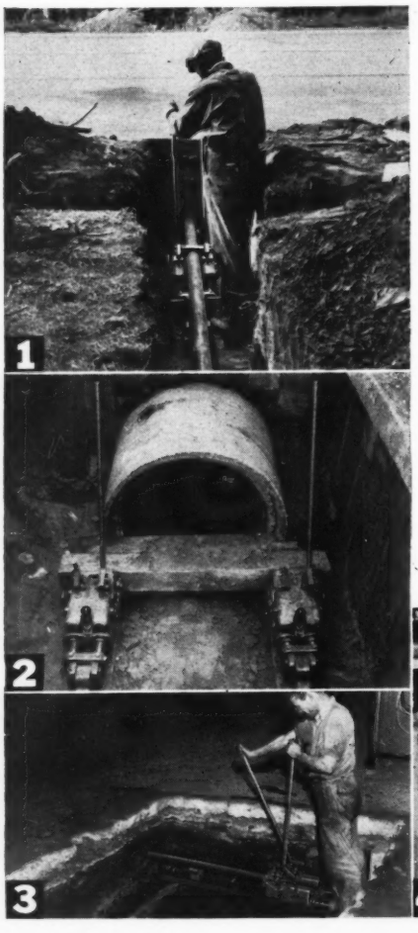
Sabotage, How to Guard Against It—by Harry Desmond Farren; 56 pages, published by National Foremen's Institute, Inc., Deep River, Conn.; 50c.

The American Year Book, 1940 — Edited by William M. Schyler and Albert Bushnell Hart; 1 079 pages, cloth, tables, published by Thomas Nelson & Sons, New York, N. Y.; $7.50. Twenty-sixth issue of an always-helpful reference volume which presents the American scene for the passing year, and tells what happened in 27 major fields, such as history, government, economics, business, social conditions, science, and the humanities. This volume presents history in the making. It tells not only what happened, and often why it happened, in the petroleum industry, the U. S. Army, highway development, mechanical engineering, federal and state governments, congress and legislature, taxation, sculpture, chemistry, literature, education, motion pictures, etc. The new edition has overtones of war and its probable economic effects.

Technical

Geology of Avoyelles and Rapides Parishes — Geological Bulletin No. 18, published by the Department of Conservation. Louisiana Geological Survey.

Investigation of Concentration of Economic Power—Prepared for the Temporary National Economic Committee by the Federal Trade Commission. The booklet deals with natural gas and natural gas pipe lines



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These photographs, taken right out on the job, show how easy it is for one or two men to push pipe underground with Greenlee Hydraulic Pipe Pushers. Write today for new Pusher Bulletin S-117, telling how you can lower underground pipe installation costs on every job.

1. Here is the Greenlee No. 790 pushing 3-inch pipe under U. S. Highway 51 without disturbing the pavement or traffic.

2. Two Greenlee No. 795 pushers with 75-ton pressure each, set up to push 36-inch concrete duct 70 feet under two railroad tracks.

3. Shown here is a Greenlee Pusher pushing pipe under the concrete flooring in an industrial plant without moving machines or tearing up the floor.

4. This shot shows a Greenlee No. 790 in the third sub-basement of a Chicago hotel pushing 168 feet under Michigan Boulevard. This tough push on an angle was made in 9 hours.

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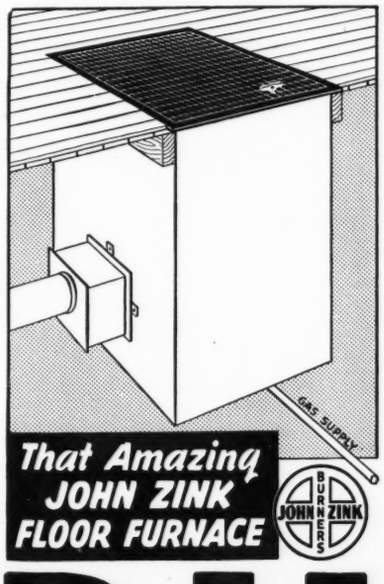

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John Zink Burners and Floor Furnaces actually convert gas fuel into usable heat.

John Zink Low Pressure Gas Burners show by test to be the most efficient and economical burners for installation in DOMESTIC FURNACES . . . HEATING BOILERS, and POWER BOILERS . . . for schools, public buildings, hospitals, institutions, etc.

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Cities Service Company
Stone & Webster Service Corporation
United Light & Power Company
Niagara Hudson Power Corporation
New York Power & Light Corporation
Central Hudson Gas & Electric Corporation
Columbia Gas & Electric Corporation
New England Gas & Electric Association
Jersey Central Power & Light Company
Minneapolis Gas Light Company
Electric Bond & Share Company
City of Duluth, Minn., Water & Light Dept.
Dayton Power & Light Company
Central Illinois Light Company
Consumers Power Company
The Detroit Edison Company
Iroquois Gas Corporation
Indiana Gas Utilities Company
Iowa Public Service Company
Jacksonville Gas Company
Kings County Lighting Company
Metropolitan Utilities District, Omaha
National Utilities Company of Michigan
North Shore Gas Company, Waukegan, Ill.
Pennsylvania Power & Light Company
Peoples Water & Gas Company, Miami Beach
Public Service Company of New Hampshire
Republic Light, Heat & Power Company, Inc.
Savannah Gas Company
Southern Counties Gas Company of California
Seattle Gas Company
Northwest Cities Gas Company

*Names of additional users on request.

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"The Personal Tree Service"
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in the United States, covering the importance of natural gas as a natural resource, the size and importance of the natural gas industry, the concentration and control of natural gas pipe line mileage, ownership by large industrial utility interests, etc.

Bibliography of Articles and Reports on the Industrial and Commercial Uses of Gas—Published as Industrial Service Letter No. 32 by the American Gas Association, 420 Lexington Ave., New York, N. Y. This bibliography is classified and arranged by magazines alphabetically and covers the period from Jan. 1, 1940 to Jan. 1, 1941.

Separation of Gases by Distillation—By Martin Shepherd, in the March *Journal of Research of the National Bureau of Standards*. In this Journal Mr. Shepherd describes the apparatus and general procedures used at the Bureau for the separation of gases by distillation and rectification at low temperatures. The subject is treated from two viewpoints—analytical separation, and the preparation of pure gases. Although distillation has been used industrially for a long time, its application to gas mixtures in the laboratory is relatively recent, most of the development having taken place during the last 20 years.

Rubbers, Natural and Synthetic — A paper given by J. W. Schade, director of research of The B. F. Goodrich Company before the annual meeting of the Institute of Aeronautical Sciences, reproduced in mimeographed form and now available upon request to the Public Relations Department of the Company in Akron, Ohio. The paper presents a comprehensive discussion of the entire field of natural and synthetic rubbers, their properties and applications.

Handbook of Chemistry and Physics—Published by The Chemical Rubber Co., 1900 W. 112th St., Cleveland, Ohio. An authoritative reference work containing over 2200 pages of scientific data compiled by specialists of recognized leadership, now offered at $2.50 a copy.

Exploration Geophysics — By Dr. J. J. Jakosky; 786 pages, buckram, 430 charts, line-drawings, and half-tones; published by Times Mirror Press, 110 South Broadway, Los Angeles, Calif.; $8.00. A compilation of fundamental principles and application of exploration methods for the use of scientists, teachers, production engineers, field men, and others. Presents detailed exposition of various theories, principles, techniques, and pieces of equipment employed in such methods as magnetic, gravitational, electrical, seismic, geochemical, drill-hole surveying, etc., with critiques, applications, estimates of costs, and other pertinent information. More than 50 experts contributed to the volume. The author is dean of University of Kansas School of Engineering and Architecture.

Gas Regulation — E. L. Mathy. *Welding Engineer*, March, 1941. pp. 19-21. Gas regulators are frequently thought of as being used only in connection with welding or domestic and industrial gas uses. These applications, however, represent only two of many uses; many scientific, medical and military activities are dependent upon gas regulation for their success. Regulators of this nature and their work are described.

Piping Design — W. Goodman. *Heating, Piping and Air Conditioning*, March, 1941. pp. 145-148. A universal chart for the solution of problems of flow in pipe lines was first presented in the October, 1940 HPAC and is republished in this issue on p. 156. For gases and vapors, the chart is applicable only as long as the change in pressure is relatively small so that the density may be regarded as substantially constant. In this article a simple modification is presented whereby the universal flow chart may be applied even to the case where large changes in pressure and density occur in the flowing gas or vapor through the use of a corrected pressure drop.

Flow in Piping—W. Goodman. *Heating, Piping and Air Conditioning*, March, 1941. pp. 155-156. Because of their convenience, charts are widely used for sizing piping systems. The universal flow chart shown on p. 156 eliminates the need for a separate chart for each fluid as it is based on Reynold's numbers and is universal in scope as long as the flow is turbulent and not streamline. This may be determined by a simple equation, and except for oil, flow is turbulent for most of the cases encountered in commercial engineering work. The chart can be used not only to size a pipe for a given rate of flow and pressure drop, but also to determine the rate of flow for a given pipe size and pressure drop, or the pressure drop for a given pipe size and rate of flow. A particularly helpful use of the chart is in determining the pressure drop for several different pipe sizes.

Calculating Supercompressibility Factors — R. L. Cochran. *Petroleum Engineer*, March, 1941, pp. 34, etc. Method of determining deviation from Boyle's Law for gas in Grapeland field, Texas.

Construction and Maintenance Standards for Pipe Line System—A. D. Greene. *Petroleum Engineer*, March, 1941, pp. 127, etc. Handbook compiled by United Gas Pipe Line Company contains set of standards, which, revised and enlarged each year, has proved invaluable aid to operating personnel.

Safety in Pipe Line Construction — A. W. Breeland. *Petroleum Engineer*, March, 1941, pp. 139-144. First stop in minimizing accidents is wise selection and proper training of workmen—maintenance of equipment in good operation condition and adequate supervision are factors of equal importance.

Pipe Line Communication Practices—L. E. Adler. *Petroleum Engineer*, March, 1941, pp. 146, 147. Value and application of communication to petroleum industry discussed from viewpoints of the executive and technical officials.

Application of Oxy-Acetylene Welding to Pipe Line Construction and Maintenance — F. C. Hutchison. *Petroleum Engineers*, March, 1941. pp. 81-84. Wrinkle-bending, welding, beveling, reclaiming pipe, and fabrication of special fittings principal uses for oxy-acetylene flame.

Phase Diagrams of Methane and Ethane Hydrates — O. L. Roberts, E. L. Brownscombe, L. S. Howe and H. Ramser. *Petroleum Engineer*, March, 1941. pp. 55-62. Phase diagrams have been determined for the methane-water and ethane-water systems in the temperature range from 10° to 60° F. (-12.2° to 15.6°C.). The equilibria studied included: (a) vapor-liquid hydrate; (b) vapor-ice hydrate; (c) liquid-liquid hydrate. Compressibility factors for ethane vapor have been determined in the pressure range from 5 to 35 atmospheres at 32° and 54°. (0° and 12.2° C.). Heats of formation of methane hydrate and of ethane hydrate from vapor and water and from vapor and ice have been calculated from the foregoing equilibrium data correcting for the deviation of the gases from the ideal gas laws. The composition of the hydrate has been found to be $CH_4.7H_2O$ and $C_2H_6.7H_2O$.

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RESULTS

A man-size problem—supplying new or expanded gas service to 18 or 20 military concentrations, virtually overnight! The demand at Ft. Ord alone was for 400 thousand cubic feet per hour, while the forts around the San Francisco Bay area—Funston, Scott, Baker, Barry, Mendell and Cronkite—required anywhere from 6 to 60 thousand each. Among the air bases, Moffett Field at Sunnyvale required 23 thousand cubic feet, while Hamilton Field in Marin County required another 18 thousand per hour. Beside these, there were the Naval Supply Depot, Benecia Arsenal, Mare Island navy yard, air bases at Stockton and Salinas and a considerable number of other defense jobs—all requiring either new or increased gas supply—and all requiring that delivery be made by a certain, definite date! So far, the P. G. & E. has a perfect record for having the gas available, and getting it delivered on time. Moreover, in our present projects of supplying Mather Field and the new Fresno air base—and whatever other defense work may be assigned to us—we intend to continue matching promise with performance!

P·G·and E· PACIFIC GAS & ELECTRIC CO.

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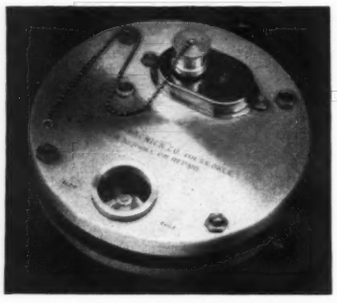
IN THOUSANDS OF INSTALLATIONS



MACNICK CHART CLOCKS

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- **ONE CLOCK GIVES YOU 10 ROTATION SPEEDS**

In the past three years thousands of Macnick Clocks have been installed in clock-operated recording instruments of all kinds. Many large companies have bought hundreds of Macnick Clocks, knowing that the reduced operating and maintenance costs would soon pay for the change-over.

Macnick Clocks are hermetically sealed—safe for life from corrosive gases, moisture, and dust—and do not require periodic cleaning. They run for eight days on a **single winding,** and are wound by a **single stem.** The easily replaceable bearings are perpetually oiled.

Interchangeable converter gears—changed without removing the clock from the instrument—give the choice of **10 chart rotation speeds** ranging from once in two hours to once in seven days. Thus, it's economical to standardize on Macnick Clocks because one clock meets **all** of your requirements and your clock inventory is cut to the bone.

Start your economy change-over program now—order Macnick Chart Clocks.

Send for Bulletin 104-A

and Arcco Chart List

▼

AMERICAN RECORDING CHART CO.

3113 East 11th St., Los Angeles, Calif.
510 South Lansing Avenue, Tulsa, Okla.

Pacific Gas and Electric Awards Annual Trophies

THE James B. Black trophy for outstanding sales achievement during 1940 was won by the Humboldt Division of Pacific Gas and Electric Co., San Francisco. The trophy consists of a beautifully mounted silver plaque and is retained by the winning division until another division is declared winner.

Award of the trophy is an annual event throughout the PG&E sales organization. Basis of the award is the best sales record in load building and control of sales expense. The trophy serves the inspirational purpose of promoting employee enthusiasm and a spirit of friendly rivalry in sales accomplishments between the company's various divisions.

In winning the 1940 Black trophy, the Humboldt division narrowly defeated both the Shasta and San Joaquin Power divisions. Past winners have been the Shasta division in 1937, the 1938 winner was the San Jose division, and the North Bay division won in 1939.

The H. M. Crawford trophy awarded by the PG&E to the division sales manager with the year's best record of accomplishment in securing cooperation of localized industry groups for business development was won in 1940 by L. J. Brundige, sales manager of the company's Sacramento division.

This is the second year in succession that Mr. Brundige has won the Crawford trophy. The award is based on the highest efficiency in organizing dealers to participate in industry development campaigns and personal initiative and resourcefulness in conducting local cooperative sales activities.

■ ■

Milwaukee Campaign Staged By Natural Gas Pipe Line

The Natural Gas Pipe Line Co. of America recently mailed letters to the entire resident group of Milwaukee county. Included was a copy of their full-page advertisement which has appeared in Sunday editions of the Milwaukee newspapers. Both letter and advertisement pointed out that local fuel interests were organized to fight the entry of natural gas and urged the people to write to their state senators and representatives asking that natural gas be allowed to come into Milwaukee.

Also enclosed was a map of the county, the names of the state legislators for the various districts, completing the company's first wholesale effort to appeal to the public in behalf of natural gas.

■ ■

Servel Aids National Defense With Consumer Cooperation

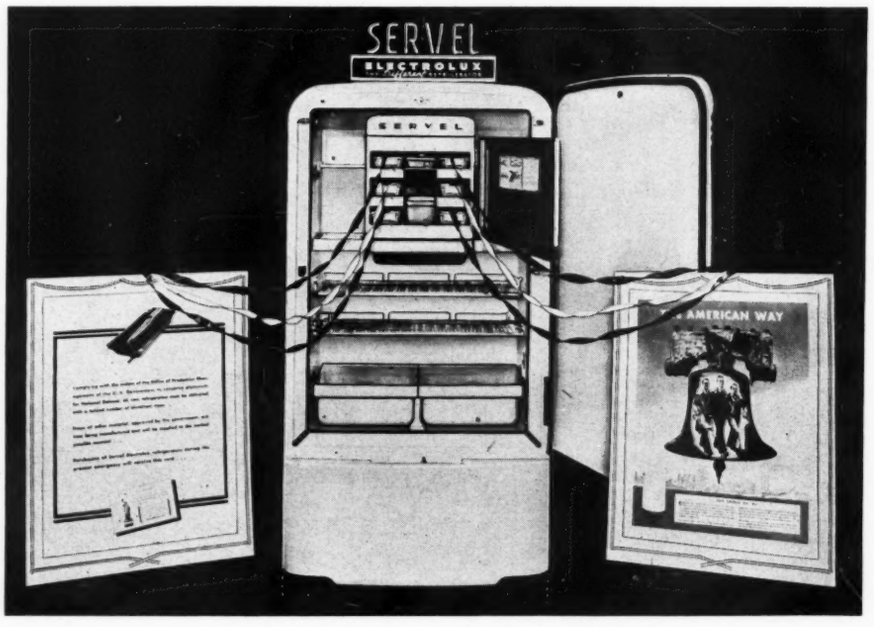
How Servel, Inc., gas companies and the consumer are cooperating with the Government's Office of Production Management in conserving aluminum for national defense is described by George S. Jones, Jr., vice president and general sales manager of Servel, in announcing a new window display which has been distributed to the company's accounts.

With the gas refrigerator as the center of the display, two placards explain how Servel is cooperating with the O.P.M. to conserve aluminum and that trays of other material approved by the government are now being manufactured and will be supplied at the earliest possible moment. (See cut below.)

One poster is based on the "American Way" quarterly campaign now being conducted by the American Gas Association Refrigeration Committee.

The aluminum trays which have been removed in compliance with the O.P.M. order have been replaced by trays made of a durable paper composition with a sign on the remaining trays stating that "The aluminum for the missing trays is doing its job for national defense." Red, white and blue streamers run from the facsimile trays to the display posters.

The original O.P.M. order stated that manufacturers and dealers are allowed one aluminum tray in refrigerators of less than six feet capacity; two trays from six to ten feet capacity and four trays for those with capacity of ten feet or more. It also stipulates that aluminum trays must not be sold separately.



The patriotic "American Way" window display distributed by Servel, Inc., to its accounts to assist them to show the public how the aluminum ice cube trays which have been removed from the gas refrigerators are aiding national defense.

Gas Utility Revenues Show Decrease in January

THE revenues of manufactured and natural gas utilities totalled $91,621,500 in January, a decrease of 1.4% from the figure of $92,947,500 reported for January, 1940, which, however, was a month of abnormally low temperatures, it was announced recently by Alexander Forward, managing director of the American Gas Association. Revenues of the manufactured gas industry aggregated $35,157,200 for the month, a decrease of 0.7%. The natural gas utilities reported revenues of $56,464,300, a decrease of 1.9% from January, 1940.

Sales of manufactured gas reported for January amounted to 37,949,600,000 cu. ft., a decrease of 0.6%, while natural gas sales for the month were 151,963,100,000 cu. ft., an increase of 1.4%. Sales of manufactured gas for domestic cooking, water heating, refrigeration, etc., were 1.4% below a year ago, while sales for house-heating purposes registered a loss of 7.2% over the preceding year. Natural gas sales for industrial purposes amounted to 65,134,400,000 cu. ft., an increase of 8.3% from the figure reported in January, 1940. Sales of natural gas for generating electric power aggregated 13,787,000,000 cu. ft., an increase of 6.8% from 1940.

■ ■

Natural Gas Conversion Into Acetylene Studied

The conversion of natural gas into acetylene is one of the projects now receiving extensive study by Texas chemists, according to Dr. E. P. Schoch of the University of Texas. Speaking recently before the Texas state finance committee, Dr. Schoch revealed also that production of acetic acid, which is used extensively in manufacture of cellulose plastics, may be commercially attractive in the near future, using natural gas as the raw material.

"We have been working many months on our process," said Dr. Schoch, "and it is almost ready for a final test. Germany is now using a variation of this process, and we are going to test both methods and then, on making a final decision, we will be ready to go. It not only will vastly increase the use of our natural gas, but it will enable us to stop gas wastage."

■ ■

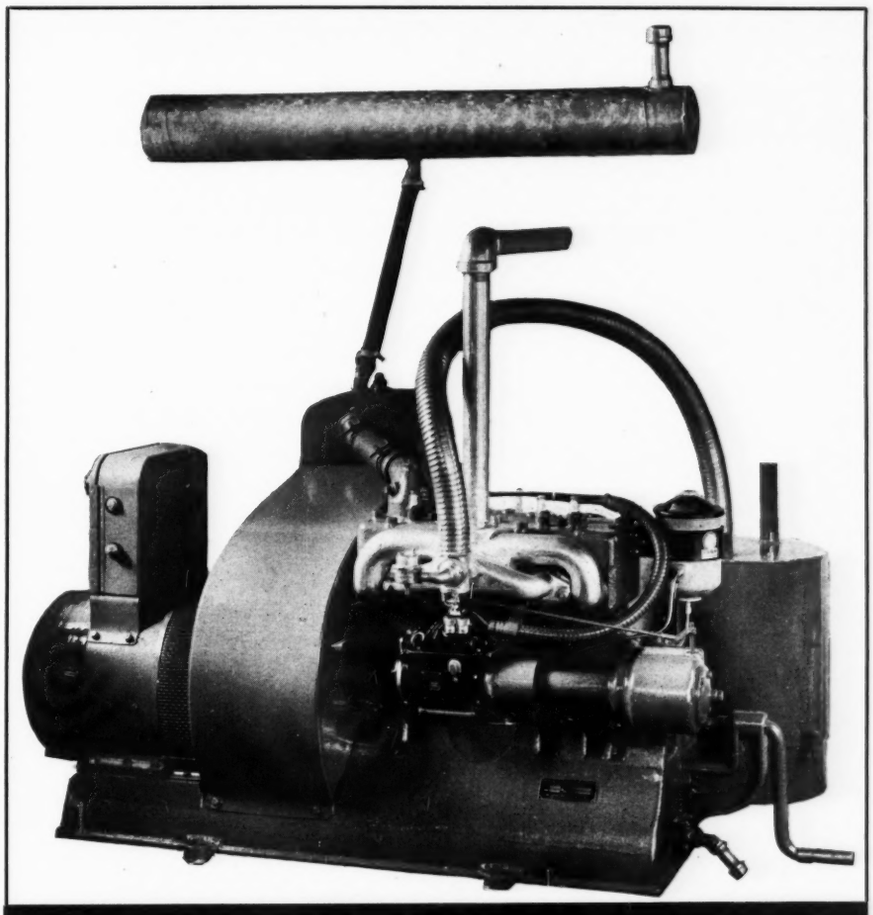
"Old Gas Bill" Contest Winners Announced

In response to the Pacific Gas and Electric Co.'s recent offer of $5 for each of the five oldest bills issued by the PG&E, or its predecessors, the five winning prizes went to Robert W. Cross, Pacific Mutual Building, Los Angeles, for a bill issued by the San Francisco Gas Co. on September 5, 1855; William A. Koch, San Anselmo, for one issued on October 1, 1860; Hugo B. Goldsmith, San Francisco, for one issued on February 1, 1862; LeRoy Kale, Stockton, for one issued by the Stockton Gas Co. on February 23, 1863; Ignatius K. Skelly, San Francisco, for one by San Francisco Gas Co., April 1, 1863.

■ ■

Civil Service Examinations

A NEW drive for engineers was begun by the Civil Service Commission on April 7, with the announcing of an engineer examination which includes all branches of engineering except chemical, metallurgical, marine, and naval architecture. The positions pay from $2600 to $5600 a year. Applications will be rated as they are received at the Commission's Washington office until June 30, 1942.



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AMPERES—Maximum 150—volts 10 to 40
R.P.M.—500 to 800 (direct connected)

Engine

4 CYLINDER—200 cu. in. displacement
SPEED—500 to 800 R.P.M., normal (positive flyball governor)
IGNITION—Scintilla-heavy duty aviation type (equipped with automatic impulse)
OILING SYSTEM—Gear type pump (low oil automatic engine stop), 6½-gallon crankcase capacity, large oil filter.
COOLING SYSTEM—Liquid—flywheel fan (Automatic excess temperature engine stop)
WEIGHT—1100 lbs.—Shipping wt., 1400 lbs.
LENGTH—4½ ft. Height—3 ft.
AIR CLEANER—Extra large oil type

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New Gas Fields Predicted

THE year 1940 marked another milestone in the 80-year history of the American petroleum industry. The 1,000,000th U. S. well drilled in the search for oil or gas had been completed.

By the end of 1940, there had been drilled 52,848 holes in the ground that were producing natural gas. There were 757,101 wells that penetrated oil sands, more than half of which, or about 390,000, were still producing. And 223,359 holes had been drilled which had found neither oil or gas, representing an investment which probably exceeded $5,500,000,000.

The whereabouts of this 1,000,000th well, or whether it was a good producing oil well, a gas well, or a dry hole, no one knows. It might have been a commonplace completion of another well in the development of an oil or gas field. It might have been a spectacular wildcat well that found a brand new field more than two miles below the earth's surface. Or it might have been just another "duster," a $25,000 or $150,000 failure, a hole in the ground that found nothing but dust. As 1940 ended, American oil and gas men had drilled 1,008,420 holes in the ground.

Our petroleum reserves had increased, too. The Committee on Petroleum Reserves of the American Petroleum Institute recently reported an estimated increase during 1940 of more than 500,000,000 barrels in the proved petroleum reserves of the United States, lifting the January 1, 1941 total to a new high of 19,024,515,000 barrels.

The committee ascribed the increase of 541,503,000 barrels over the 18,483,012,000 barrel estimate of January 1, 1940 to discovery and development by the petroleum industry of 1,893, 350,000 barrels of new reserves as compared with 1940 production of 1,351,847,000 barrels of crude oil. Thirteen of the 23 oil-producing states discovered or developed more oil than they produced in 1940, the report indicated, and with the sole exception of California, proved reserves of every oil-producing state were increased by discoveries and by upward revision of earlier estimates in the light of new developments.

At a recent meeting of petroleum geologists, the probability of finding new oil and gas fields in the United States for many years to come was indicated. They outlined the location of favorable areas covering a vast portion of the country and amounting to millions of acres. Not included in the inventory were the many unexplored areas in regions where oil and gas now are being produced, nor possible formations deeper than 15,000 ft.

Hundreds of thousands of square miles which are underlain by from 1000 to 15,000 ft. of sedimentary rock were charted as possible locations of undiscovered petroleum reserves. Experience in the finding and drilling of oil fields now producing has proved, the geologists report, that the chance of producing oil is in proportion to the amount of sediment present.

Underlying sedimentary rocks were charted in 32 states, including a number in which fields have not yet been found, and not including several present oil-producing states. The inventory also covered the geology of Canada and Alaska, where huge potential oil-producing areas were outlined.

In the five years from 1936 through 1940, according to one authority, 1218 new oil and gas fields and 762 new oil-producing formations in old fields (which essentially are new oil fields) have been found. More new oil fields were discovered in 1940 than in any previous year in the industry's history. Since 1935 oil men have discovered in new fields, and developed by revisions and extensions in old fields, 14,000,000,000 barrels of new oil reserves, more oil than was produced from the 1859 beginning of the industry to 1929, and one-third of all the oil that has been found since 1859.

■ ■

Oregon Franchise Granted

R. S. Rhodes and associates, of Los Angeles, Calif., recently secured a franchise for the furnishing of natural gas to North Bend, Ore. Paul Nelson, who made the franchise application before the city council for the company, explained that they have 13,000 acres of land under lease between the Coquille River and Coos Bay, and that drilling is expected to start very soon. The franchise will become operative when the company obtains gas wells and brings the gas to Coos Bay.

■ ■

Suspend Installation Costs

The Public Utility Commission has suspended for six months proposed changes in the rules of the Peoples Natural Gas Co., requiring prospective consumers on certain pipe lines in rural districts, to bear cost of installation.

The new rules were to have become effective lately but because of an apparent increased cost to consumers, the Commission postponed the effective date.

Arkansas Louisiana Gas Co. Buys Camden, Ark., Plant

THE Camden Gas Corp., Camden, Ark., and the Arkansas Louisiana Gas Co., with principal office at Shreveport, La., have filed with the Federal Power Commission a joint motion to dismiss the proceeding concerning alleged discriminatory rates for natural gas purchased by the Camden corporation from the Arkansas Louisiana company.

The joint motion states that an agreement has been reached whereby Camden Gas Corp. is selling and Arkansas Louisiana Gas Co. is purchasing for $226,000 the gas distribution plant serving Camden and vicinity. Under terms of the agreement, it is stated, the transfer is to be consummated in about 60 days unless foreclosure proceedings are resorted to and, with approval of the Commission, it is proposed to grant the Camden corporation a reduction of $5000 annually in town border delivery charges. The Camden unit proposes to pass three-fifths of this reduction to domestic consumers, the remainder to be retained until it recovers "all expenses incurred in connection with this litigation, at which time the entire reduction will be passed to its customers other than industrial in such form as the Arkansas Department of Public Utilities may direct or approve."

■ ■

Natural Gas to Serve Gayville, S. D.

The town of Gayville, S. D., is to have natural gas for the first time early this summer as soon as a "feeder" from the main pipe line south of the town and a distributing system can be built, E. J. O'Brien, manager of the Yankton, S. D., Gas Co., announced. The project will cost between $15,000 and $20,000, Mr. O'Brien said. It will include construction of the line into the town from the present pipe line of the Northern Natural Gas Co., a distance of two miles; meter and regulating station and a distribution system within the town to make the gas accessible to all residences.

Work on the project is to start soon. It is expected to be completed by July 1.

■ ■

Kansas Pipe Line to Buy Nebraska Natural

The Kansas Pipe Line and Gas Co., Phillipsburg, Kan., has been authorized by the Federal Power Commission to purchase the Nebraska Natural Gas Co., Topeka, Kan., for a consideration of $1,700,000. The name of the purchaser will be changed to the Kansas-Nebraska Natural Gas Co., Inc.

The certificate must be exercised within 90 days or it will lapse. The purchaser, the commission said, indicated that it would "see what can be done about rearranging the rate structure to pass on to the public the benefits that will accrue in the way of reduced costs."

■ ■

Southern Gas Lines Builds New Compressor Station

A new compressor station, the cost of which is estimated at $200,000, is to be built by Southern Gas Lines, Inc., of Monroe, La., about one mile south of Clarks, La., in Caldwell Parish. A. V. Miller, superintendent of the company, is to be in charge of the new construction.

Increased requirements of Army camps near Alexandria, which are supplied with Monroe field gas through facilities of the Southern company, necessitated construction.

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Natural Gas Purification
Connelly IRON SPONGE
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MODERN *Products*

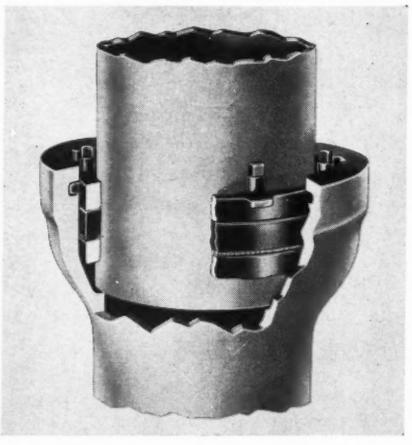
Bellmaster Joint

Dresser Mfg. Co., Bradford, Pa.

Model: Dresser Bellmaster Joint, Style 85.

Description: Developed in answer to a need for a simpler, easier-to-install mechanical joint that will last as long as the cast-iron pipe on which it is used, the new Dresser Bellmaster Joint, Style 85, possesses a number of installation advantages and construction features not found in other types of joints. Low in first cost, faster and easier to install, the Style 85 Joint is said to be a great advance in CIP jointing.

The Bellmaster Joint is a single-gasketed, self-contained mechanical joint that is strong, flexible, corrosion-proof. It consists of a few simple parts—Inner Ring, Armored Gasket, Outer Ring, a set of Cap-



screws—all factory assembled into a single unit. To install, the Bellmaster is simply inserted in the bell end of pipe prepared to accommodate the Joint, locked in place by twisting slightly clockwise, spigot end "stabbed in," and capscrews tightened. Working principle is simple and effective: as you tighten the capscrews, the inner ring is drawn closer to the locked outer ring, thus expanding the gasket against the outside of the spigot and against the inside of the bell, making a tight seal against both.

The Bellmaster's outstanding characteristic is its extreme simplicity. It comes completely assembled. Workmen have only one piece to handle when making up the Joint. The Bellmaster is easy to order, to handle, to install. This "floating joint," with its large-section resilient gasket, allows deflection in any direction, as well as longitudinal movement caused by expansion and contraction. Its unusual deflective properties permit connecting pipe over a ditch and "snaking" it in even when rounding a curve. In the smaller sizes, it can be deflected through an arc of as much as 18° without impairing its tightness or efficiency. The Bellmaster is completely enclosed by the bell of the pipe in which it is inserted. There are no exposed parts or outside lugs. Possibility of capscrews in Joints being broken due to settlement of line is eliminated because capscrews, as well as entire Joint, are independent of the bell or spigot; stresses in screws remain constant regardless of degree of deflection in Joint.

■ ■

Gate Valve

Valve Division, Reed Roller Bit Co., Houston, Texas.

Model: Reed Double Disc Gate Valve.

Description: The Reed Valve design is basically that of the double disc gate valve and was designed and developed to insure greater dependability and ease of operation. The body, bonnet, packing and stem are of conventional design, but the disc holder, which is integral with the stem, is cylindrical in form with a through conduit. The disc holder is positioned within the cylindrical bore in the body, but does not contact it, as it is supported by bearings at top and bottom of the disc holder. The seating members are two opposed discs which float and are accurately guided in spaces in the disc holder. The Reed Valve is opened or closed by a single operation—a quarter turn of the valve stem. Among the many advantages of this advanced type of design are: (1) Discs lifting directly away from their seats as the valve opens. Before the discs start to travel from the closed to the open position, the trailing edges of the disc are lifted directly away from their seats. This permits partial equalization of pressure on both sides of the down-stream disc and further rotation of the stem carries the discs to the open position with only slight frictional resistance; (2) in the closing operation, the discs are accurately moved to their seats

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MODEL 20 . . .

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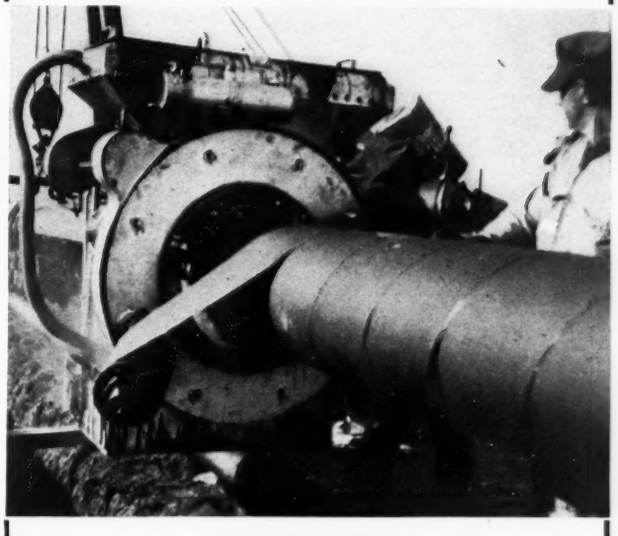

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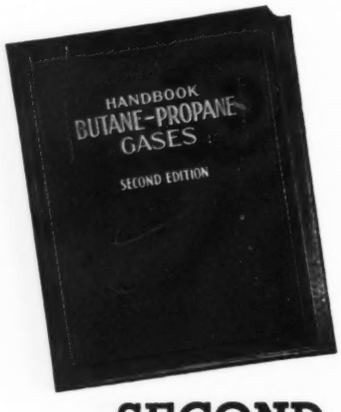

415 Pages

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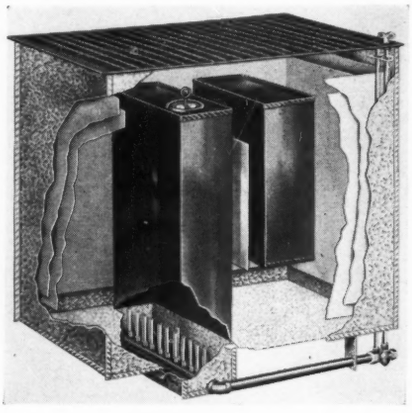
by projecting shoulders on the disc holder and are positively held against their seats by pressure; (3) Discs cleaning their seats as the valve opens or closes. The leading edges of the moving discs wipe the cylindrical bore of the body while the valve is being either opened or closed. As the discs travel to the closed position, they clean the seats of all foreign matter, gums, etc., preventing packing such foreign materials onto the seat faces. The conduit passage in the disc holder further protects the seats in the open position from the erosive effects of entrained foreign particles. Reed Valves can be manufactured of any material required by the processing system specifications and for temperatures up to 1000° F. in all standard pressure ratings.

■ ■



Floor Furnace

The Howle Co., 2515 Archer Ave., Chicago, Ill.

Model: Howle Gas-fired Floor Furnace.

Description: The Howle patented gas-fired floor furnace is a miniature, pipeless furnace for one-story building with or without basement. The inner heating unit is full vitreous porcelain enamel inside and outside, scientifically constructed to provide the utmost in durability and efficiency. The combination of a large heating surface with a long delayed flue travel enables us to obtain maximum heat from the fuel. The unit is crimped and sealed by a patented process which insures a gas-tight, stay-tight construction. The heavy porcelain coating inside and outside gives positive protection against rust and corrosive action of the acid moisture generated by combustion (even against salt atmospheres). The casing is of three-wall galvanized steel construction consisting of an inner double wall and the main outside single wall. Made in three sizes, these furnaces are hung from the floor joists. The installation is extremely simple and no room space in the home is occupied.

■ ■

Catalogs

Natural Gas Equipment, Inc., Los Angeles, Calif., have just issued a catalog containing pertinent information regarding the various types of N.G.E. burners. The bulletin was issued to facilitate the selection and sizing of equipment; more detailed descriptions of these burners being found in individual bulletins describing each one. This catalog con-

tains data for ordering burners; information concerning the proper selection of controls after the type of burner has been chosen; installation instructions; and information relative to secondary requirements, as well as other data.

• Filled with data never before revealed, an attractive 20-page compounding manual for Hycar O. R., an oil resistant type of synthetic rubber, has just been published by the Hydrocarbon Chemical and Rubber Co., Akron, Ohio, and is now available upon request. Subjects discussed in relation to the oil resistant type of synethetic rubber are accelerators, adhesion to metals, antioxidants, blending with other materials, calendering, cements, examples of compound types, fillers, fabrication, heat resistance, lamination, mastication, mixing, molding, pigments, plasticizers, processing, softeners, solvents, specific gravity, tubing, vulcanization and waxes. General recipes for printers' roller compounds, oil resistant automobile parts, a type of motor support, gasoline hose tube, light colored all-purpose stock, cheap molded compound, belt cover compound and soling compound are given, as well as the physical properties and the volume change resulting from immersion in various solvents.

• A new 12-page bulletin, supplementing the manufacturer's recently issued complete catalog, and devoted exclusively to the company's line of gas controls, has just been issued by General Controls Co., 801 Allen Ave., Glendale, Calif. The new leaflet includes illustrated descriptions of the Trimtherm, General's new room thermostat, the company's full line of automatic gas heating package sets, automatic shut-off valves, solenoid valves, low pressure gas regulators, and introduces new improvements made on General's B-60 Series all-gas-actuated gas valve. Charts showing, sizes, dimensions, pressures, capacities, shipping weights, prices and other technical data are included to cover each item listed.

• Concealed radiant heating, employing pipe coils laid beneath floors to distribute heat evenly throughout the room and supplied with steam, hot water or vapor steam from a central heating plant, is the subject of a booklet just published by A. M. Byers Co., Pittsburgh, Pa. The importance of controlled heat in such a system makes it particularly adaptable for the use of gas as fuel. The booklet describes the history, principles and advantages of concealed radiant heating, gives comparative costs, describes and illustrates the design of installation, answers the more pertinent questions concerning the system and gives a bibliography of reference material.

• Radiant heating is discussed in an illustrated 44-page bulletin recently released by the A. M. Byers Co., Pittsburgh, Pa. The foreword of this pamphlet states: "In recent years, there has been a revival of interest in wet type heating systems, and radiant heating in particular, and there is reason to believe that radiant heating may soon take its place as one of the recognized heating methods in this country, just as it has in England and on the continent of Europe." The bulletin discusses the history of this heating system, its theory, and offers many practical applications as well as illustrations and plans of actual installations. Calculation principles for the design of radiant heating installations are given, as well as notes on the selection of pipe for radiant heating installations. It is believed that the data presented offers a cross-section of modern thought on the subject of radiant heating since it has been gathered from recognized authorities.

Over 265 Satisfied
"Carboseal" Anti-Leak *users*

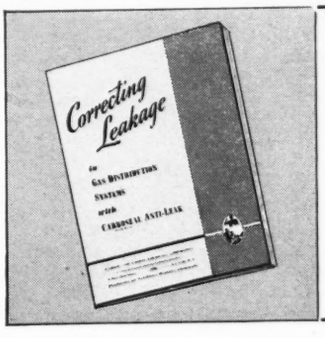
. . . Get Long-Term, Low-Cost Correction of Dry Bell-and-Spigot Joint Leakage

MORE than 265 gas properties the country over are now using "Carboseal" anti-leak treatment to correct packed bell-and-spigot joint leakage in systems distributing dry gas. And they get results! . . . The first three treatments recently applied to one mile of four-inch main reduced leakage 83 per cent. Another 1500 feet of four-inch main treated in the same way showed a leakage reduction of 82 per cent . . . Nine hundred feet of six-inch main treated as a test case showed 100 per cent leakage reduction. As a result, this company is treating and placing in service a number of cast iron mains that had previously been abandoned.

Experience shows that joints treated with "Carboseal" anti-leak keep gas inside the main and stay tight indefinitely. Joints treated eight years ago are still tight today on the soap test . . . And the cost of this treatment is surprisingly low. The average of the actual costs of 16 users who treated over 200 miles of main was 50 cents per joint.

In addition, "Carboseal" anti-leak treatment saturates dirt and rust lying in the main, holding it in place and preventing it from being carried into customer appliances.

You too can do what over 265 satisfied users have already accomplished with this accepted method of reducing unaccounted-for gas loss. Plan now to start using "Carboseal" anti-leak treatment in *your* system.



Send for this Book

This 20-page book tells more about "Carboseal" anti-leak treatment—how it can be applied by either the gravity or the hose method, what equipment is needed, how much the treatment costs, and what results can be obtained. A request on your company letterhead will bring you a copy, without obligation. Write for *your* copy *now*.

CARBIDE AND CARBON CHEMICALS CORPORATION

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York, N. Y.

The word "Carboseal" is a registered trade-mark of Carbide and Carbon Chemicals Corporation.

PRODUCERS OF SYNTHETIC ORGANIC CHEMICALS

LARGEST PRODUCTION FACILITIES

of any Cast Iron Pipe foundry in America. Daily capacity more than 40,000 feet.

LARGEST CENTRIFUGAL PIPE

of any Cast Iron Pipe foundry in America. Complete line of sizes, **including 48-inch.**

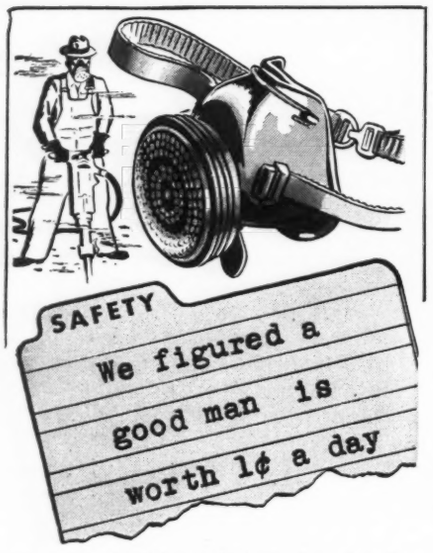
BROADEST SELECTION OF JOINTS

for special services of any Cast Iron Pipe foundry in America. "Acipco" has pioneered in developing Cast Iron Pipe for fields of **super-service.**

Whatever your piping problem, refer it to "Acipco" and rest assured of conscientious assistance from an organization backed by 36 years of experience in producing highest-quality Cast Iron Pipe and Fittings. Address "Acipco" office nearest you.

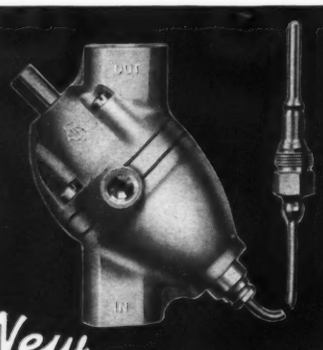
AMERICAN CAST IRON PIPE CO., BIRMINGHAM, ALA.

New York City, Chicago, Minneapolis, Kansas City, Pittsburgh, Cleveland, Dallas, Los Angeles, Houston, San Francisco, El Paso



That dust Jack is working in day after day ... is it harmless? *Before* he slows up from lung congestion or something worse, give him a Willson Bantam Respirator. He'll be able to do a better day's work ... day after day, without a layoff. The Bantam weighs but 3¼ oz...is comfortable to wear for hours because it fits the contour of the face. By merely changing filters, the Bantam becomes U. S. Bureau of Mines approved protection against lead ... which means that you need stock but *one* respirator for all jobs. Ask for folder BR 40. E. D. Bullard Co., 275 Eighth Street, San Francisco, California. B-3

Everything BULLARD in Safety



New

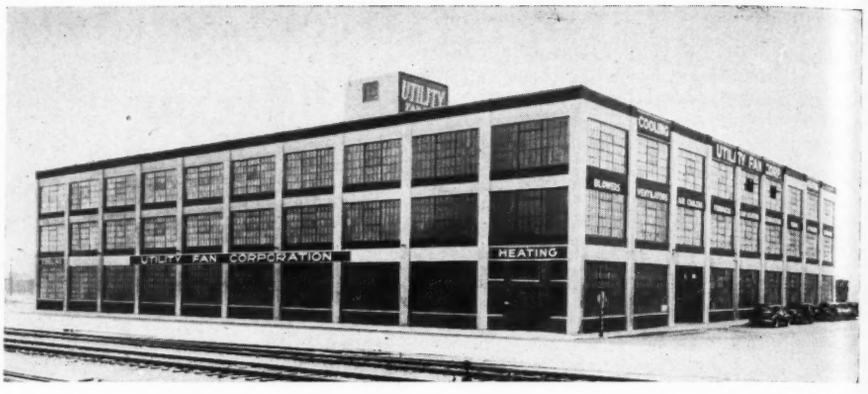
BASO

SERIES 800 VALVE

3/8" AND 1/2"
STRAIGHT THRU
OR ANGLE TYPES

Write for Complete Information

Milwaukee Gas Specialty Company
MILWAUKEE WISCONSIN



New plant of the Utility Fan Corp., Los Angeles, Calif.

More Demonstrations Urged By Harper-Wyman

THE importance of floor demonstrations in making sales is stressed in a new 12-issue campaign being released to gas journals this month by Harper-Wyman Co., Chicago, Ill., makers of the Harper system of top-burners for gas ranges. These new advertisements are two-page magazine inserts, each in four colors.

The first pages of each ad are reproductions of paintings by the well-known artist, Frank Lemon, showing the first demonstrations of great inventions. Each illustration is described in accompanying text, but the main theme of the series, "Nothing convinces like demonstration," is repeated as the headline for each advertisement. The first picture in the series goes back to the year 1660 to show the discoverer of gas, Dr. John Clayton, demonstrating the "spirit" to a group of amazed friends assembled in his study. The interesting angle is the study of the faces of the spectators.

The second pages of the advertisements reproduce letters from leading appliance retailers testifying that demonstrations pay in the selling of gas ranges. Also featured on these pages is a new give-away booklet for salesmanagers, "How tot Sell More Gas Ranges." The booklet contains a dozen tested floor demonstrations of the modern range.

The company reports intense interest on the part of retailers in the booklet. To date, hundreds of requests for it have been received. These, in the opinion of Harper-Wyman Co., bear out their own conviction that demonstrations are now becoming recognized as an essential part of the successful sales routine.

■ ■

Announce Judges' Names for Connelly Photo Contest

The names of judges selected for the amateur photographic contest being sponsored by the Connelly Iron Sponge & Governor Co., Chicago, Ill., were announced recently as follows: Mr. Samuel Insull, Jr., Chicago, Ill.; Mr. Vernon G. Leach, Chicago, Ill.; Mr. Lester J. Eck, Minneapolis, Minn.; all of whom are well known in the amateur photography field.

The Connelly Photographic Contest which started March 1 and continues to June 30 is open only to officers and employees of gas companies and their families. It is reported that this contest has already caused tremendous interest among the picture taking fraternity in the gas industry.

Entries are being grouped into three classifications and will be judged on the basis of composition and technical execution as well as pictorial value and appropriateness of subject. While entry blanks and bulletins giving full information on the contest have been mailed to every listed gas company in America, additional blanks and full details may be obtained by writing the contest manager, Connelly Iron Sponge & Governor Co., 3154 S. California Ave., Chicago, Ill.

■ ■

Utility Fan Corp. Opens New Los Angeles Plant

Many heating and cooling dealers from many parts of the west, engineers and utility officials attended the opening of the new Utility Fan Corp. plant, Los Angeles, Calif., on April 10. The new factory, which marks the fifth expansion of the company in 10 years, has more than three acres of floor space and represents an investment of approximately $250,000. (See cut above.)

Products manufactured on modern mass production assembly lines include gas-fired forced-air furnaces, floor and dual-register furnaces, circulating heaters, evaporative air coolers, blowers and industrial exhausters. Equipment in the new plant is the equal of any sheet metal shop in the West, and includes new installations of a travograph, electric spot and seam welders and a large size dynamic balancer.

■ ■

Northern Natural Gas Co. To Revamp Stock

Northern Natural Gas Co., Omaha, Neb., advised the Securities Exchange Commission recently of its intention to reclassify its outstanding 203,000 shares of common stock without par value into 1,015,000 shares of common stock of $20 value, and to eliminate its authorized shares of preferred stock and 97,000 unissued shares of common stock.

The company announced also that one of its three parent companies, United Light & Railways Co., intended to offer its portion of the new common stock, 35% of the total, for public sale. Northern's other parents are Lone Star Gas Corp., which owns 30% of the common, and North American Light & Power Co., which owns 35%.

■ ■

Ohio Bill May Exempt Natural Gas Producers

The House of Representatives of the Ohio State Legislature recently passed and sent to the state senate a bill proposing to exempt independent producers of natural gas from regulation of the state utilities commission when they are not engaged in marketing.

Power Commission Dismisses Pipe Line Applications

THE Federal Power Commission has dismissed, for want of jurisdiction, the applications filed by Western Natural Gas Co. and by Independent Natural Gas Co. for certificates of public convenience and necessity authorizing the construction of natural gas pipe lines to Milwaukee and Madison, Wis., and to other communities in the southeastern part of the state.

The Commission stated that under provisions of the Natural Gas Act its jurisdiction to issue certificates of public convenience and necessity for the construction of facilities exists only when it is proposed to construct such facilities for the transportation of natural gas to a market in which natural gas is already being served by another natural gas company and that the communities proposed to be served by the applicants do not constitute such a market.

Extensive public hearings were held on the application at Madison, Wis., and both the State Corporation Commission of Kansas and the Public Service Commission of Wisconsin participated in the hearings jointly with the Commission's trial examiner. The cities of Milwaukee and Madison and the Natural Gas Pipe Line Co. of America appeared at the hearings as interveners.

Western Natural Gas Co. asked for a certificate to construct a pipe line about 800 miles in length from the Hugoton field in Kansas to Milwaukee, at an estimated cost of $25,208.154, and the Independent Natural Gas Co. to construct a line from the Texas Panhandle to Milwaukee, at an estimated cost of $28,698,000.

■ ■

Gas and Gas Appliances The Cause of Few Fires

Gas and gas appliances, as causes of fires in the United States, are far down on the list of those means by which over $300,000,000 of property is destroyed annually, a recent survey shows. In this report, the National Fire Protection Association, basing its figures on data secured from fire marshals of 15 states, and extending its findings to cover the entire country, pointed out that smoking ranks first, causing a 12.7% loss, whereas gas and gas appliances cause only 0.6% of the 685,000 fires occurring each year.

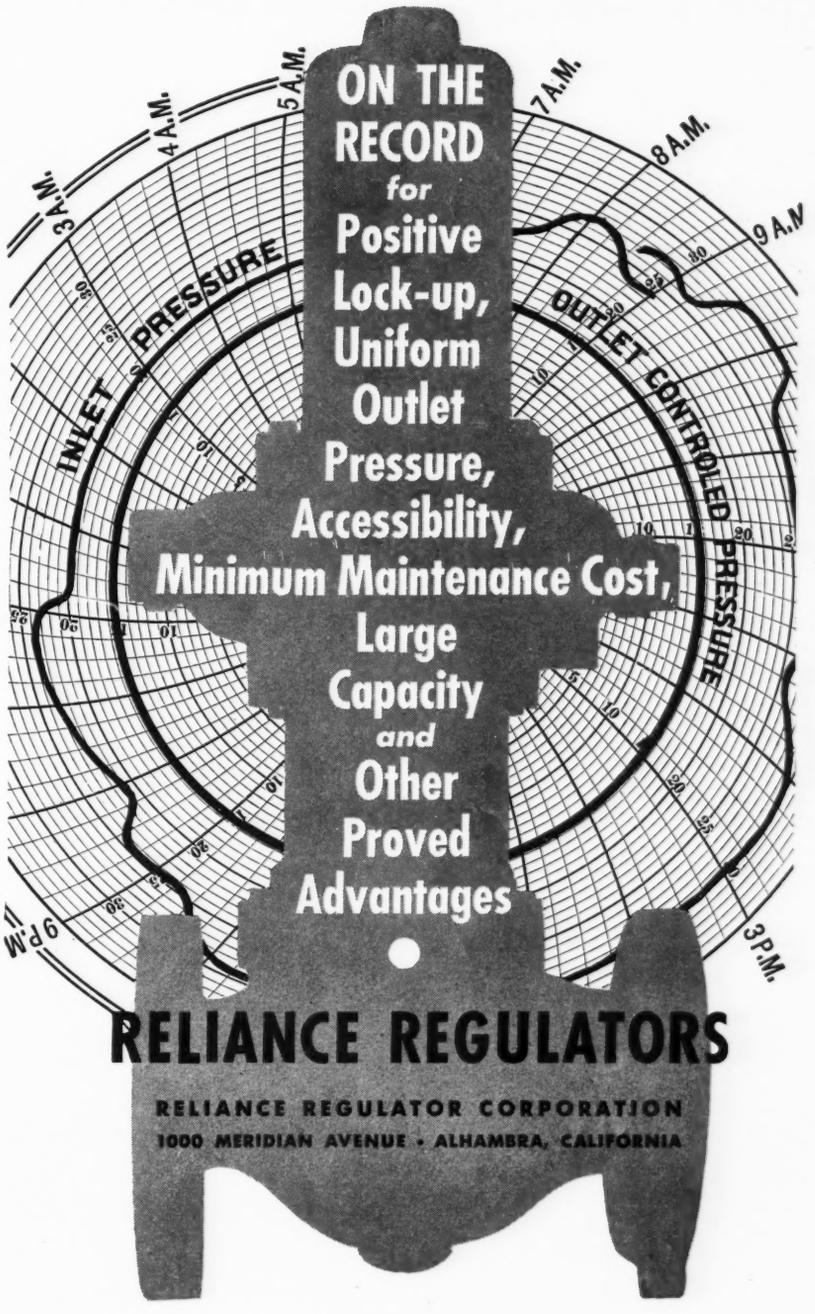
Nearly half of all fires take place in ordinary house dwellings and cause about 27% of the total loss. Other causes and their percentages suggest that sparks on the roof result in 11.6% loss; unknown causes are third destroying 11.5%; electrical origins are fourth with 9.5%; and defective and overheated chimneys and flues place fifth with 8.5%.

■ ■

Newark, Ohio, Companies File for Consolidation

Consolidation of the Industrial Gas Co. and the Gas Producing Co., both of Newark, Ohio, was proposed in an application filed recently with the Ohio State Utilities Commission. The Gas Producing Co. produces the gas which the Industrial Gas Co. distributes to industrial consumers in Newark and vicinity.

The application asked approval of a plan whereby the merged company would issue $646,000 in $100 par common stock in exchange for the outstanding no-par stock, which includes 5000 shares of the Industrial company and 1000 shares of the Producing company. The new firm would assume liability for outstanding 5% bonds; $40,000 Industrial and $1,125,000 Producing.



GAS—1709 W. 8th Street, Los Angeles, California

Yes! SEND ME GAS

for 3 Years at $2.00

SUBSCRIPTION RATES: United States, Mexico, Cuba, South and Central American countries (in advance), three years $2.00; all other countries, $3.00 per year.

Name..... Position.....

Company.....

Address.....

City..... State.....

☐ Check enclosed ☐ Send bill

Omaha, Neb., to Expand City Gas Works Boiler Plant

DETAILED plans were announced recently for a 30% expansion of the Omaha, Neb., city gas works boiler plant, to be made during this summer at a cost of $245,000. General manager Walter Byrne said engineering estimates are complete and that bids for $145,000 worth of boilers, piping, equipment and installation work were to be opened on April 10. Bids on a $75,000 boiler house addition, 50 ft. x 60 ft. and 150 ft. high are to be called approximately May 1, Byrne said.

The expansion project will provide two new 500 hp. boilers, the first two of three units needed in the next two years to replace old boiler units. Operation may begin in October. The boiler plant now includes seven boilers with combined capacity of 1750 hp. Live steam is one of the essentials in gas manufacture, and Byrne said increased capacity is required to meet rising peak gas demands, which are expected to rise considerably next winter due to a large increase in house heating use.

■ ■

GEORGE A. BURRELL

Gas Engineer

Design—Construction—Reports
Court Work

■

Suite 1909
20 Pine Street
New York City

1936-42 5th Avenue
Pittsburgh, Pa.

A Money-Maker for the Dealer!

★ "Pacific" Model A-80 Furnace is built in two easily handled sections. Interchangeable casing panels and reversible blower permit quick transposition of Heating and Blower Units in the shop or on the spot. It saves the dealer effort, time, money. The customer gets a gas-heating and ventilating unit of utmost efficiency, low cost operation, long reliable service and *lower initial cost*. Profits will get a *lift* with "Pacific" A-80 Furnace, the 1941 money-maker. Write for Catalogue.

PACIFIC GAS RADIATOR COMPANY
Huntington Park, California

Expansion Plan Completed By Pittsburgh Company

For economical and defense reasons subsidiaries of the Philadelphia Co. and of Columbia Gas & Electric Corp., in the Pittsburgh district have contracted to boost their exchange of natural gas from a small amount daily up to 100,000,000 cu. ft. of natural gas.

The exchange avoids a "cross-haul" of gas and the expenditure of putting more than 50,000 tons of steel and new equipment into development work. The new arrangement permits the Philadelphia Co., to supply gas in Kentucky to the Columbia Gas subsidiary —United Fuel Co.; which in turn supplies an equal volume of natural gas to the Philadelphia Co., in Northern West Virginia.

Philadelphia Co., subsidiaries have proposed laying a 190-mile, 20-inch line from Kentucky to Northern West Virginia. During 1941 Kentucky-West Virginia Gas Co., a subsidiary of the Philadelphia Co., plans a $3,000,000 expansion and development program in Kentucky for drilling from 150 to 180 wells, the construction of a large compressor station at Dwale, Ky., and the purchasing of equipment to supplement present transportation facilities.

■ ■

Sharples Chemicals Inc. New Name of Philadelphia Firm

Effective April 28, the former Sharples Solvents Corp., Philadelphia, Pa., adopted a new name for their company, according to a recent announcement by N. J. Hooper, vice president and sales manager. The firm will henceforth be known as Sharples Chemicals Inc.

The change in corporate name was necessary because of the great change in the nature of the company's business which has occurred in the past few years. Mr. Hooper states, "Our production of many new organic chemicals and the new development of new uses for these materials has made it desirable for us to be identified as a chemical company rather than as a solvents manufacturer. We shall, of course, continue to manufacture those products for which we have long been known and we will make the same effort to serve our customers in the future as we have in the past."

■ ■

Gas Refrigeration Contest Leaders Announced

Winning companies in the second-quarter contest of the 1940-41 sales campaign on gas refrigeration, sponsored by the Refrigeration Committee of the American Gas Association, have been announced by B. T. Franck, vice president of the Milwaukee Gas Light Co., Milwaukee, Wis., and refrigeration committee chairman.

The second-quarter contest covered sales in January, February and March. The complete campaign began last October 1 and ends next September 30.

Gas companies won quarterly honors in 35 classifications in six divisions, grouped according to the type of sales and the number of meters served by each company. Several companies won more than one award.

Winners received honor certificates for their outstanding performance, and in addition won temporary possession of the Annual Best Performance trophies offered by Servel, Inc.

Walter J. Combs (left) and John Zink

John Zink Co. Demonstrates With Traveling Exhibit

John Zink Co., Tulsa, Okla., is putting on the road another traveling exhibit of heating boiler burners, commercial conversion burners and floor furnaces, with the latest model of the display being consigned to the Houston, Texas, territory of which Kenneth D. Goodwin has charge.

The exhibit takes to the consumers, dealers and gas companies a comprehensive display of John Zink floor furnaces and burners for every heating and power need. Walter J. Combs (left), sales engineer, and John Zink, owner, are shown inspecting the traveling exhibit. A sales engineer of the John Zink Co. accompanies the exhibit to demonstrate the various burners and their applications.

■ ■

Taggart Bros. Start Work On 85 New Gas Wells

The Taggart Brothers Co. of Big Rapids, Mich., which controls large acreage of both developed and semi-developed natural gas fields in Michigan, recently started its 1941 drilling program which is expected to account for 85 or more test wells during the year. Because of weather conditions, the Taggart company suspended operations last December.

Drilling machinery has been moved into Osceola county, where the first two wells in the 1941 campaign are under way. Most of the work this year is to be spread through Osceola, Missaukee, and Clare counties, where wells drilled last year by the company opened up three new fields. Using rotary drilling equipment, the company has a schedule calling for five to seven wells per month during the year.

■ ■

Southern Natural Gas Co. Buys Apex Pipe Line

Southern Natural Gas Co., of Birmingham, Ala., recently acquired the properties of the Apex Gas Co., of DeSoto Parish, La., from A. J. Lanier for a stated consideration of $300,000. The Securities and Exchange Commission had issued an order March 21 approving the deal.

The Apex line was built through DeSoto Parish during the summer of 1939, when A. J. Lanier contracted to furnish natural gas to the Gulf Public Service Co., serving Coushatta, Campti, Natchitoches and 11 small intermediate towns along the line. The line is 32 miles in length, running from Wemple, La., near the Red River Parish line, through to Joaquin, Texas.